Invacare® TDX SP® Series
TDX SP2® Series
SERVICE MANUAL

CE

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INVACARE®

These instructions contain information about:
Testing work
Repair Instructions

This manual is part of the instructions for use.

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1 Introduction

1.1 General information

- Service and maintenance work must be carried out taking this service manual into account.
- It is imperative that you observe safety information.
- Information about operation or about general maintenance and care work on the mobility aid should be taken from the operating manual.
- You can find information about ordering spare parts in the spare parts catalogue.
- Only use original Invacare® spare parts. The guarantee will become invalid if other spare parts are used!
- We reserve the right to make any alterations on the grounds of technical improvements.
- The mobility aid may only be maintained and overhauled by qualified personnel.
- The minimum requirement for service technicians is suitable training, such as in the cycle or orthopaedic mechanics fields, or sufficiently long-term job experience.
  - Experience in the use of electrical measuring equipment (multimeters) is also a requirement.
  - Special Invacare® training is recommended.
- Alterations to the mobility aid which occur as a result of incorrectly or improperly executed maintenance or overhaul work lead to the exclusion of all liability on the side of INVACARE.
- If you have any problems or questions please contact Invacare® Service.

1.2 Notes on transport

- If the mobility aid has to be shipped back to the manufacturer for major repairs, you should always use the original packaging for transport.
- Please attach a precise description of the fault.

1.3 Definition and representation of information and safety information in this manual

Different types of information and signal words are used throughout this manual.

HAZARD!

The signal word "HAZARD!" refers to immediate hazards.

- *The following lines in italics refer to actions which serve to avoid such hazards.*

WARNING!

The signal word "WARNING!" refers to possibly-occurring hazards which can lead to death or serious injuries if they are not avoided.

- *The following lines in italics refer to actions which serve to avoid such hazards.*

ATTENTION!

The signal word " ATTENTION!" refers to possibly-occurring hazards which can lead to minor injuries and/or material damage if they are not avoided.

- *The following lines in italics refer to actions which serve to avoid such hazards.*

CAUTION!

The signal word "CAUTION!" refers to hazards which could lead to material damage if they are not avoided.

- *The following lines in italics refer to actions which serve to avoid such hazards.*

Note

The signal word "Note" is used to denote general information which simplifies the handling of your product and refers to special functions.

1.4 Hazard symbols and symbols used

Different types of hazard symbols and symbols are used throughout this manual.

General hazards

This symbol warns you of general hazards!

- *Always follow the instructions to avoid injury to the user or damage to the product*!

BURN HAZARD!

This symbol warns you of the danger of chemical burns, for example due to the discharge of battery acids!

- *Always follow the instructions to avoid injury to the user or damage to the product*!

DANGER OF CRUSHING!

This symbol warns you of crushing hazards due to inattentive working with heavy components.

- *Always follow the instructions to avoid injury to the user or damage to the product*!

EXPLOSION HAZARD!

This symbol warns you of an explosion hazard, which can be caused by excessive tyre pressure in a pneumatic tyre.

- *Always follow the instructions to avoid injury to the user or damage to the product*!

Wear safety shoes

The symbol refers to the requirement for wearing safety shoes.

- *Wear standardised safety shoes during all work.*

Wear eye protection

This symbol refers to the requirement for wearing eye protection, for example when working with batteries.

- *Wear eye protection when this symbol is shown.*

Wear safety gloves

This symbol refers to the requirement for wearing safety gloves, for example when working with batteries.

- *Wear safety gloves when this symbol is shown.*

Note

This symbol identifies general information which is intended to simplify working with your product and which refers to special functions.

Requirements:

- This symbol identifies a list of various tools, components and items which you will need in order to carry out certain work. Please do not attempt to carry out the work if you do not have the listed tools available.

Always dispose used or damaged batteries correctly

The symbol refers to information for the correct disposal of used or damaged batteries.

1.5 Images in this manual

The detailed images in this manual are given digits to identify various components. Component numbers in text and operational instructions always relate to the image directly above.

2 Safety and fitting instructions

These safety instructions are intended to prevent accidents at work, and it is imperative that they are observed.

2.1 Before any inspection or repair work

- Read and observe this repair manual and the associated operating manual!
- Observe the minimum requirements for carrying out the work (see chapter entitled „General information)!

2.2 Personal safety equipment

Safety shoes

The mobility device, and some of its components, are very heavy. These parts can result in injuries to the feet if they are allowed to drop.

- *Wear standardised safety shoes during all work.*

Eye protection

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- *Always wear eye protection when working on any defective or possibly defective batteries.*

Safety gloves

It is possible that battery acid can be discharged when working on defective batteries or when handling batteries improperly.

- *Always wear acid-proof safety gloves when working on any defective or possibly defective batteries.*

2.3 General safety information and information about fitting / removal

WARNING: Danger of crushing!

Various components such as the drive unit, batteries, seat etc are very heavy. This results in injury hazards to your hands!

- *Please note the high weight of some components*! *This applies especially to the removal of drive units, batteries and the seat.*

WARNING!

Injury hazard if the vehicle starts moving unintentionally during repair work!

- *Switch the power supply off (ON/OFF key)!*
- *Engage the drive!*
- *Before raising the vehicle, secure the wheels by blocking them with wedges!*

ATTENTION!

Fire and burn hazard due to electrical short-circuit!

- *The mobility device must be completely switched off before removal of voltage-carrying components! To do this, remove the batteries.*
- *Avoid short-circuiting the contacts when carrying out measurements on voltage-carrying components!*

CAUTION!

Danger of burns from hot surfaces on the motor!

- *Allow the motors to cool down before commencing work on them.*

ATTENTION!

Injury hazard and danger of damage to vehicle due to improper or incomplete maintenance work!

- *Use only undamaged tools in good condition*.
- *Some moving parts are mounted in sockets with PTFE coating (Teflon™). Never grease these sockets!*
- *Never use "normal" nuts instead of self-locking nuts.*
- *Always use correctly-dimensioned washers and spacers*
- *When reassembling, always replace any cable ties which were cut during dismantling.*
- *After completing your work / before renewed start-up of the mobility device, check all connections for tight fitting.*
- *After completing your work / before renewed start-up of the mobility device, check all parts for correct locking.*
- *Only operate the vehicle with the approved tyre pressures (see technical data).*
- *Check all electrical components for correct function. Please note that incorrect polarity can result in damage to the electronics.*
- *Always carry out a trial run at the end of your work.*

CAUTION!

Danger of injury and damage to property, if the maximum speed reduction on a wheelchair with a lifter does not function correctly!

The wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.

- *Test the maximum speed reduction for correct function after any maintenance work or modifications to the wheelchair.*

Note

Mark all current settings for the wheelchair (seat, armrests, backrest etc.), and the associated cable connecting plugs, before dismantling. This makes reassembly easier.
All plugs are fitted with mechanical safety devices which prevent release of the connecting plugs during operation. To release the connecting plugs the safety devices must be pressed in. When reassembling ensure that these safety devices are correctly engaged.

WARNING!

Any changes to the drive program can affect the driving characteristics and the tipping stability of the vehicle!

- *Changes to the drive program may only be carried out by trained Invacare® specialist dealers!*
- *Invacare® supplies all wheelchairs with a standard drive program ex-works. Invacare® can only give a warranty for safe vehicle driving behaviour - especially tipping stability - for this standard drive program!*

3 Tightening torques

The tightening torques stated in the following list are based on the thread diameter for the nuts and bolts for which no specific values have been determined. All values assume dry and de-greased threads.

CAUTION!

Damage can be caused to the mobility device due to improperly tightened screws, nuts or plastic connections.

- *Always tighten screws, nuts etc to the stated tightening torque.*
- *Only tighten screws or nuts which are not listed here fingertight.*

Thread	M4	M5	M6	M8	M10	M12	M14	M16
Tightening torque in Nm ±10%	3 Nm	6 Nm	10 Nm	25 Nm	49 Nm	80 Nm	120 Nm	180 Nm

UNC Thread	**Tightening torque in Nm**
1/4"-20	11-7 Nm
5/16"-20	22-14 Nm
3/8"-16	41-25 Nm
7/16"-14	67-40 Nm
1/2"-13	100-60 Nm
9/16"-12	150-90 Nm
5/8"-11	210-130 Nm
3/4"-1	370-230 Nm
7/6"-9	600-370 Nm
1"-8	900-550 Nm

4 Layout of components and componentry

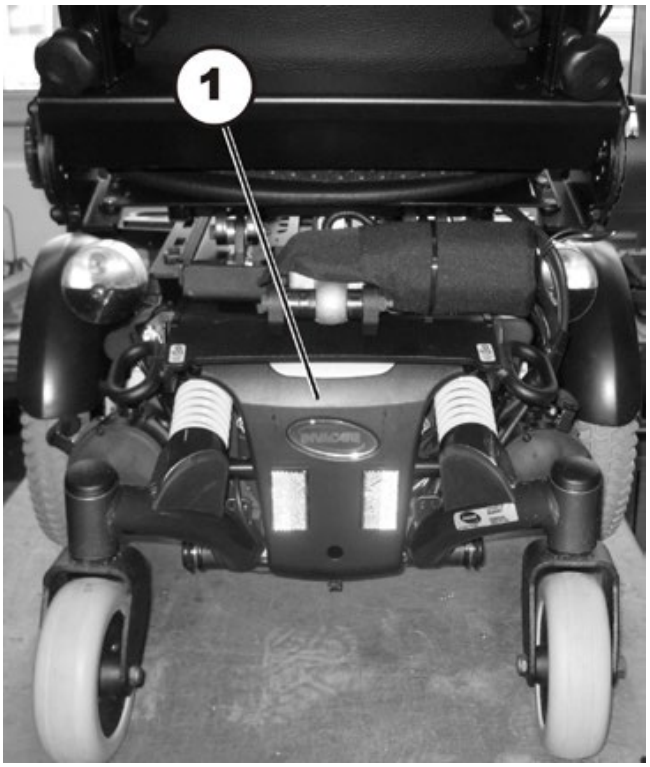
4.1 Overview

At rear underneath seat:

Electronic modules

The electronic modules are located underneath the rear cover panel (1).

The electronic modules used are described in chapter 4.2.

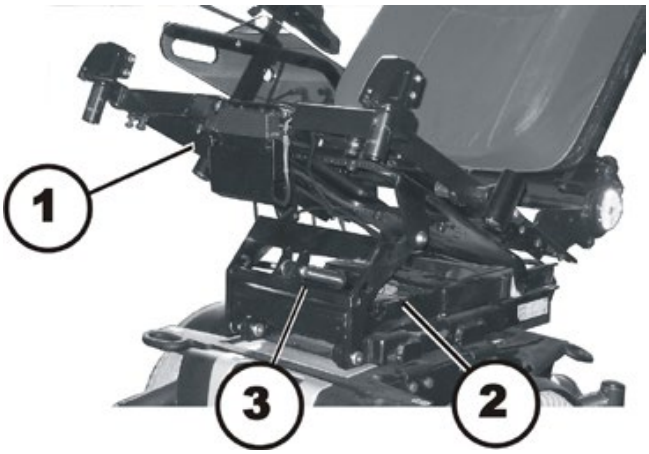


In rear cover:

(1) – Operating hours counter (optional)

At the front, underneath the seat:

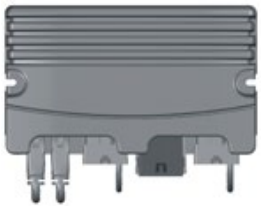
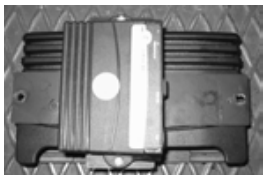
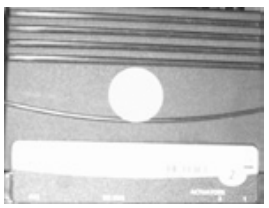
(1) – actuator module (optional)
(2) – lifter actuator (optional)
(3) – tilt actuator (optional)

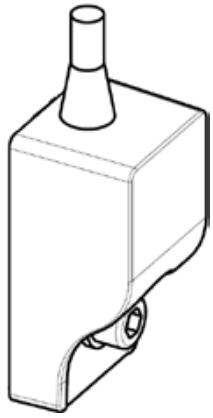


4.2 Electronic modules

A variety of electronic modules can be fitted to the wheelchair.

Before you connect any wheelchair components such as adjusting motors/actuators or motors to the electronic modules, you should first ensure that you know exactly which electronic module has been fitted. Please refer to the following table for an overview.

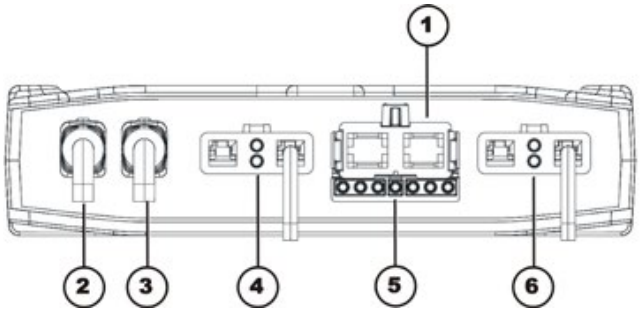
Electronic module	Designation	Joystick boxes	Notes
	ACS2 ACS2 PMA90L	REM 24 REM A REM B REM 550	
	ACS2 ACT actuator module		The actuator module is optional.
	Shark	Shark 2 remote	
	Shark with lighting PCB		The lighting PCB is optional.
	ACT actuator module		The actuator module is optional.
	Lighting PCB		The lighting PCB is optional.

Electronic module	Designation	Joystick boxes	Notes
	G-Trac sensor		The G-Trac sensor is optional
	Operating hours counter		The operating hours counter is optional.

4.2.1 ACS2 electronic module

Connections

1) Battery 24V
2) Bus cable (to remote or ACT)
3) Bus cable (to remote or ACT)
4) Motor M1
5) Light
6) Motor M2



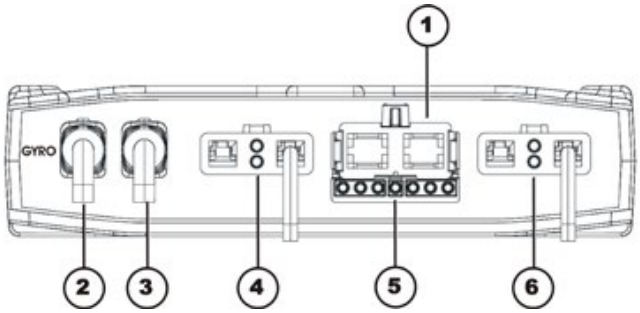
Rubber stoppers for free slots

2) & 3) Order number: 1552876

4.2.2 ACS2 PMA90L electronic module

Connections

1) Battery 24V
2) Cable to G-Trac sensor (GYRO)
3) Bus cable (to remote or ACT)
4) Motor M1
5) Light
6) Motor M2

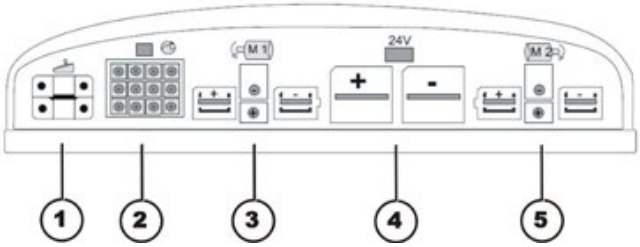


4.2.3 Shark electronic module

4.2.3.1 Shark with DCI 12-pole

Connections

1) Cable to remote
2) DCI for actuators/lighting (12-pole)
3) Right-hand motor M1
4) Battery 24V
5) Left-hand motor M2



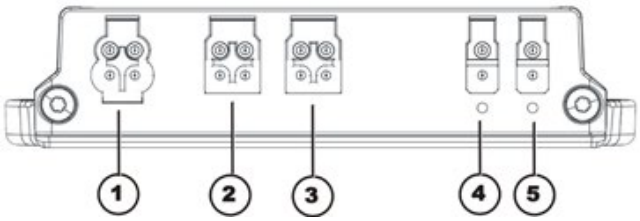
4.2.4 ACT actuator module

A range of adjusting motors, also known as actuators, can be fitted to the wheelchair. These actuators are either connected directly to the electronic module or to a separate actuator module. The actuator module is connected with the electronic module via a bus cable.

4.2.4.1 ACT 2 actuator module

Connections

1) ACI*
2) Bus cable (to remote or ACT)
3) Bus cable (to remote or ACT)
4) Adjusting motor/actuator - Channel 2
5) Adjusting motor/actuator - Channel 1



Rubber stoppers for free slots

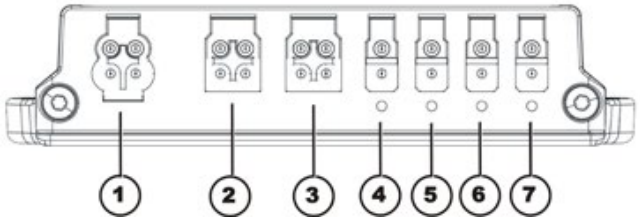
1) Order number: 1555701
2) & 3) Order number: 1552876
4) & 5) Order number: 1555700

* The ACI connection is used for actuator limitation or speed reduction.

4.2.4.2 ACT 4 actuator module

Connections

1) ACI*
2) Bus cable (to remote or electronic module)
3) Bus cable (to remote or electronic module)
4) Actuator - Channel 4
5) Actuator - Channel 3
6) Actuator - Channel 2
7) Actuator - Channel 1



Rubber stoppers for free slots

1) Order number: 1555701
2) & 3) Order number: 1552876
4) to 7) Order number: 1555700

* The ACI connection is used for actuator limitation or speed reduction.

4.2.5 Lighting PCB

The lighting PCB connections are printed directly on the circuit board.

5 Service plan (1x annually)

CAUTION!

Danger of injury and damage to property, if the maximum speed reduction on a wheelchair with a lifter does not function correctly!

The wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.

- *Test the maximum speed reduction for correct function after any maintenance work or modifications to the wheelchair.*

Component	Check	Remedy	Notes	ü
Safety belt	Damage to safety belt	Replace belt if damaged.	See chapter 9.1.	
	Belt lock function	Replace belt if damaged.	See chapter 9.1	
Armrests	Damage to armrests	Replace covering if damaged		
	Armrest fixings	Tighten screws		
Side panels	Damage to side panels	Replace side panels if damaged		
	Side panel fixings	Tighten screws		
Seat angle adjustment	Tight seating of SL fuses	Replace SL fuses if necessary		
Power backrest (if fitted)	Damage to backrest Seams Fixing Check cable Check function	Replace parts if damaged Tighten screws Replace cable motor if necessary		
Frames (chassis) / battery mounting	Check fixings, welded seams and battery mounting	Tighten screws Replace components if necessary		
DAHL Docking Station	Check screws	Tighten screws		
Stability lock system	Check gas cylinder	Repair or replace if damaged Replace gas cylinder every 2 years!	See chapter 8.24	
	Check adjustment	Speed	See chapter 8.24.5.	

Component	Check	Remedy	Notes	ü
Wheel suspension and wheels	Check drive wheels for tight fit and side play	Adjust, replace wheel hubs	See chapters 8.10.1 and 8.10.3/8.10.4	
	Check steering wheels for tight fit, float and side play	Replace wheels, wheel fork or wheel bearings	See chapter 8.9	
	Tyres	Repair or replace if damaged	See chapter 8.10.2.	
	Check suspension	Repair or replace if damaged	See chapter 8.12	
	Check straight running	Replace wheels, wheel fork or wheel bearings	See chapter 8.9.	
Drive units, clutch mechanism	Motors	Check motors	See chapter 7.	
	Check functions in drive and push modes Check clutch mechanism	Check carbon brushes, replace if necessary Replace motor if necessary. Tighten screws/nuts, adjust or replace if necessary	See chapter 8.15	
Brakes	Inspect motor brake	Check motor brake	See chapter 7.2.	
Legrests	Check welded seams, interlocking, screws, footplates	Tighten, replace if necessary		
Power legrests (if fitted)	Check cable Check contacts check functions	Replace cable if necessary		
Lighting (if fitted)	Check cable Check function	Replace lamp or cable if necessary	See chapter 8.8.	
Battery mounting	Check battery support and mounting belts for damage	Replace if necessary		

Component	Check	Remedy	Notes	ü
Batteries	Check batteries for damage	Replace batteries if necessary	See chapters 8.5.2/8.5.3 and 8.5.4	
	Check battery voltage	Charge batteries		
	Check battery voltage	Charge batteries	See operating manual	
	Check contacts and terminals	Clean contacts and terminals	Please refer to the safety information in chapter 8.5.2/8.5.3 and 8.5.4 for handling batteries	
Remote / electronic module	Remote, status display blinking	Evaluate error/blink code	See chapter 6.	
	Fixings	Tighten fixings, replace if necessary		
	Cables and connecting plugs	Tighten cables and connecting plugs, replace if necessary		
	Drive lever function	Replace drive lever if necessary Replace remote if necessary		
	Power supply	Tighten cables and connecting plugs, replace if necessary		
Drive program	Check drive electronic program version	Update software if newer version available.	See chapter 8.4.	

6 Operational faults

The various electronic modules can be fitted in connection with differing remotes in the wheelchair. Rectification of operational faults is dependent on the electronic module fitted.

The electronic modules used are described in chapter 4.2.

Note
The tables for rectification of operational faults listed in the following chapters are only an excerpt from the original manufacturer's manuals.
You can obtain the original manuals from Invacare®.

If you have problems with the wheelchair, please proceed as follows:

- First assess the possible cause of the problem using the following table.
- Check the remote status display. Evaluate the error code.
- Carry out the necessary checks and repairs as recommended in the following table.

6.1 Drive fault diagnosis

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
Wheelchair will not start	The remote status display illuminates normally and displays blink code 5/6.	Drive motors disengaged	Engage drive motors	See operating manual
	Remote status display does not illuminate	Batteries defective	Replace batteries	See chapter 8.5.2/8.5.3.
		Completely discharge battery	Pre-charge batteries	See operating manual
		Power supply to remote interrupted	Check master fuse	See chapter 8.5.5/8.5.6.
			Check cables between the modules for loose connections and damage	See chapter 8.5.7.
		Remote defective	Replace remote	See chapter 8.3.1.
	Remote status display blinking	Various causes	Assess error code	See chapter 6.2 and 6.3.
Wheelchair judders in drive mode	None	Batteries defective (unstable voltage)	Replace batteries	See chapter 8.5.2/8.5.3.
		Drive motor(s) defective	Replace motor(s)	See chapter 8.15.1/8.15.2.
			Replace carbon brushes	See chapter 8.15.6/8.15.7.
Wheelchair pulls to left or right	None	Drive motors running asymmetrically	Change programming to synchronise motors.	See chapter 8.4.
Error message does not go out	None	Bad connections	Check all connecting cables.	See chapter 8.5.7.
		Motor brake defective	Measure internal resistance of brakes, replace motor if defective.	See chapters 7.2 and 8.15.1/8.15.2
Motors stop and start irregularly	None	Voltage decline	Stop journey and allow electronic to cool down.	
Motor runs but loses power	None	High motor loading causes electronic module to decrease voltage	Stop journey and allow electronic to cool down.	

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
Motors stop and do not start again	None	High motor loading causes electronic module to decrease voltage	Leave wheelchair switched on and allow electronic module to work. Charge batteries overnight with wheelchair switched on.	
	None	Fuse burnt out	Check cabling and replace fuse	See chapters 8.5.7 and 8.5.5/8.5.6
	None	Motor defective	Check carbon brushes and replace if necessary	See chapter 8.15.6/8.15.7.
			Measure internal resistance of motor, replace motor if defective.	See chapters 7.1 and 8.15.1/8.15.2
	None	Electronic module defective	Replacing the electronic module	See chapter 8.3.2.
Motors lose power during journey	None	Bad connections	Switch wheelchair off, wait 10 seconds, switch wheelchair on again. Check all cabling.	See chapter 8.5.7.
Motor judders or runs irregularly, or only one motor runs	None	Carbon brushes worn	Check carbon brushes and replace if necessary	See chapter 8.15.6/8.15.7.
		Clutch(es) defective	Replace clutch	See chapter 8.15.4/8.15.5.
		Bearing defective	Replacing the motor	See chapter 8.15.1/8.15.2.
		Collector defective	Measure internal resistance of motor, replace motor if defective.	See chapters 7.1 and 8.15.1/8.15.2
Motors do not run	None	Bad connections	Check all cabling.	See chapter 8.5.7.
		Fuse burnt out	Check cabling and replace fuse	See chapters 8.5.7 and 8.5.5/8.5.6
		Batteries defective	Replace batteries	See chapter 8.5.2/8.5.3.
		Cabling to electronic module or joystick defective	check cabling	See chapter 8.5.7.
		Electronic module defective	Replacing the electronic module	See chapter 8.3.2.

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
	Corroded contacts	Water, salt or urine has penetrated	Check cabling, replace if necessary.	See chapter 8.5.7.
Motor makes clicking noise	None	Clutch(es) defective	Replace clutch	See chapter 8.15.4/8.15.5.
		Bearing defective	Replacing the motor	See chapter 8.15.1/8.15.2.
		Collector defective	Measure internal resistance of motor, replace motor if defective.	See chapters 7.1 and 8.15.1/8.15.2
Scraping noise or motor blocked	None	Clutch(es) defective	Replace clutch	See chapter 8.15.4/8.15.5.
		Bearing defective	Replacing the motor	See chapters 8.15.1/8.15.2 and 8.15.4/8.15.5
		Transmission defective	Replace transmission.	See chapters 8.15.1/8.15.2 and 8.15.4/8.15.5
Transmission makes clicking noise	None	Transmission defective	Replace transmission.	See chapters 8.15.1/8.15.2 and 8.15.4/8.15.5
		Drive wheel loose	Tighten drive wheel, secure bolts with Loctite if necessary	See chapter 8.15.1/8.15.2.
Transmission losing oil	None	Sealing ring on drive shaft defective	Replace transmission if sealing ring defective.	See chapters 8.15.1/8.15.2 and 8.15.4/8.15.5
			Check carbon brushes for oil wetting, replace motor if brushes wet	See chapters 8.15.1/8.15.2, 8.15.4/8.15.5 and 8.15.6/8.15.7
Irregular running	None	Drive shaft movable or bent	Check drive shaft, replace transmission if defective.	See chapters 8.15.1/8.15.2 and 8.15.4/8.15.5
Parts lost	None	Parts lost	Reattach parts once found.	
Batteries not being charged	None	Fuse burnt out, cable defective	Check cabling and replace fuse	See chapters 8.5.7 and 8.5.5/8.5.6
		Batteries defective	Replace batteries	See chapter 8.5.2/8.5.3.
	LEDs blinking on charging unit	Charging unit defective	Replace charging unit	See charging unit operating manual

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
Short charging period	None	One of the batteries could be defective	Replace batteries	See chapter 8.5.2/8.5.3.
Wheelchair runs too slowly	None	Remote defective	Replace remote	See chapter 8.3.1.
		Batteries defective	Replace batteries	See chapter 8.5.2/8.5.3.
Actuator does not react	Remote shows blinking "E"[1] or blink code 2[2] Status diode on lighting/actuator module does not go out even if the remote has been switched off or disconnected	Lighting / actuator module defective	Replace lighting / actuator module	See chapter 8.3.2.
	None	Cable disconnected or damaged	Safeguard cable connection, replace cable if necessary	See chapter 8.5.7.
		Electrical adjusting motor defective	Check adjusting motor	
		Remote defective	Replace remote	See chapter 8.3.1.

1 Only applies to remote SD24

2 All remotes except SD24

6.2 REM remotes: Error codes and diagnostic codes

The drive electronic can automatically rectify some faults. In this case the status display will stop blinking. Switch the remote on and off again several times. Wait around 5 seconds each time before switching the remote on again. If this does not rectify the fault, determine the cause using the blink codes from the following table.

BLINK CODE	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
1 x blink	Module defective	Replace defective module	See chapter 8.3.2.
2 x blink	Accessory error (e.g. short-circuit in adjusting motor)	Check accessory connections, check accessory	See chapter 8.5.7.
	Lifter too high or too low (seat not at driving height)	If the lifter is raised, lower it slowly until the status display stops blinking. If the lifter is too low, raise it slowly until the status display stops blinking. Only drive when the seat is at driving height.	See operating manual
3 x blink	Fault on left-hand motor (M2). Connection loose/defective or motor defective	Check connection plug, check motor	See chapters 8.5.7 and 7.1
4 x blink	Fault on right-hand motor (M1). Connection loose/defective or motor defective	Check connection plug, check motor	See chapters 8.5.7 and 7.1
5 x blink	Fault/brake fault on left-hand motor (M2). Connection loose/defective or motor defective	Check connection plug, check motor	See chapters 8.5.7 and 7.1
6 x blink	Fault/brake fault on right-hand motor (M19. Connection loose/defective or motor defective	Check connection plug, check motor	See chapters 8.5.7 and 7.1
7 x blink	Completely discharge battery	Pre-charge battery	See operating manual
8 x blink	Battery voltage too high	Switch lighting to low battery voltage Check battery charger	See charging unit operating manual
9 or 10 x blink	Faulty data transmission between modules	Remove electronic modules except for the power module and the remote. Replace the modules one after another in order to ensure which was the one causing the fault.	See chapter 8.3.2.
11 x blink	Drive motors overloaded / overheated	Switch remote on and off / wait if necessary	-

BLINK CODE	POSSIBLE CAUSE	SOLUTION	DOCUMENTATION
12 x blink	Compatibility problems between modules	Remove incorrect module	See chapter 8.3.2.

6.3 Shark 2 remote: Error codes and diagnostic codes

The drive electronic can automatically rectify some faults. In this case the status display will stop blinking. Switch the remote on and off again several times. Wait around 5 seconds each time before switching the remote on again. If this does not rectify the fault, determine the cause using the following link codes:

BLINK CODE	MEANING	SOLUTION	DOCUMENTATION
1	Operating error	Set drive lever to neutral central position (just release drive lever) and switch on again	
2	Battery error	Check battery and mains cable	See chapter 8.5.7.
		Charge batteries. If you switch the wheelchair off for a few minutes, the batteries can often charge themselves up enough to enable a short journey. You should, however, only use this solution in emergency situations because it results in excessive battery discharging.	see operating manual
		Replace batteries	See chapter 8.5.2.
3	Fault on left-hand motor (M2)	Check motor cable and connecting plug. Check motor.	See chapters 8.5.7 and 7.1
4	Fault on right-hand motor (M1)	Check motor cable and connecting plug. Check motor.	See chapters 8.5.7 and 7.1
5	Fault at left-hand (M2) motor brake	Check cable and plug.	See chapters 8.5.7 and 7.2
6	Fault right-hand (M1) motor brake	Check cable and plug.	See chapters 8.5.7 and 7.2
7	Error in Shark remote	Check bus cable in remote and connecting plug. Replace remote.	See chapter 8.3.1.
8	Error in Shark electronic module	Check all the cables and plugs in the Shark system. Replace electronic module	See chapters 8.5.7 and 8.3.2
9	Communication error in Shark system	Check all cables and connecting plugs in the Shark system. Replace remote.	See chapters 8.5.7 and 8.3.1
10	Unknown error	Check all cables and connecting plugs.	See chapter 8.5.7.
11	Incompatible remote	The wrong remote has been connected. Ensure that electronic module code and the remote code match.	See chapters 8.3.1 and 8.3.2

6.4 Diagnosis of charging device faults

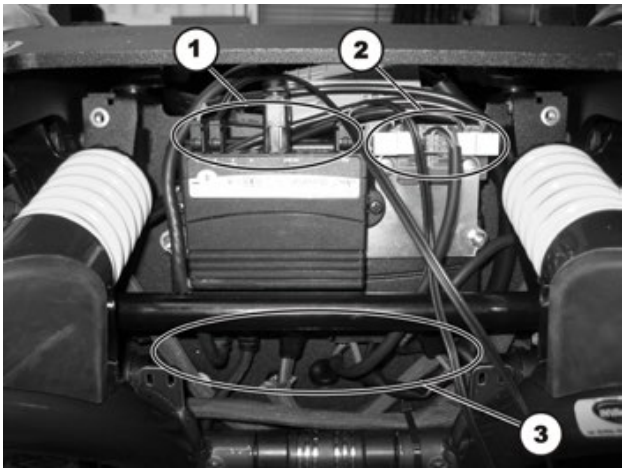
SYMPTOM	POSSIBLE CAUSE	SOLUTION
No LEDs illuminating on battery charger	Charging device not connected to mains supply.	Ensure that the battery charger has been plugged in.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the battery charger to Invacare® Service for repair.
	LEDs are burnt out	Send the battery charger to Invacare® Service for repair.
	An internal fuse might be burnt out.	Send the battery charger to Invacare® Service for repair.
Batteries do not charge	Fuse on wheelchair has burnt out.	Check wheelchair fuses. See chapter 8.5.5/8.5.6.
	Battery charger not connected to wheelchair.	Ensure that the battery charger has been connected to the wheelchair.
	No mains supply	Check the mains supply with a voltmeter.
	Defective mains supply cable.	Check the mains supply cable. Replace damaged cables or send the battery charger to Invacare® Service for repair.
	Battery charger could be defective.	Use a battery charger which you know is working properly to charge the batteries. Send the defective battery charger to Invacare® Service for repair.
	Battery voltage is too low to operate wheelchair.	Replace the batteries. See chapter 8.5.2/8.5.3.

7 Test procedures

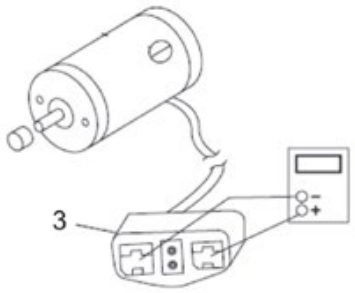
7.1 Testing the motor

Requirements:
- Phillips screwdriver size 2
- digital multimeter with resistance measurement

- Remove the rear panel as described in chapter 8.1.2.



- Pull the motor plug (3) out of the electronic module.



- Connect the digital multimeter to the motor plug contacts (3) and measure the resistance between the contacts.

Note
A resistance of between 0.5 and 5 ohms indicates a motor ready for operation.

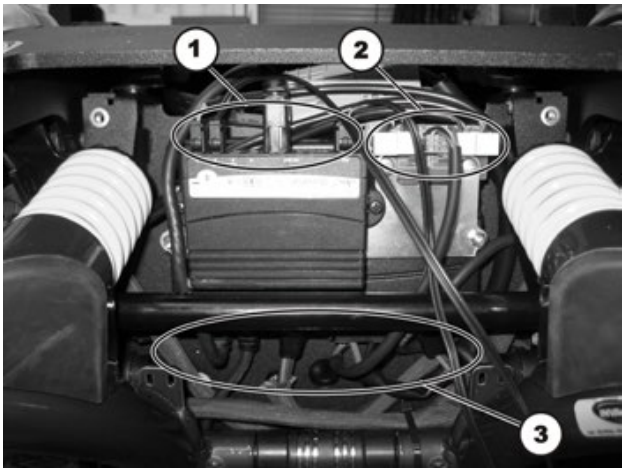
A resistance of between 15 ohms and infinity indicates a defective motor. High resistances are normally caused by bad connections or worn carbon brushes.

7.2 Testing the electro-mechanical parking brake

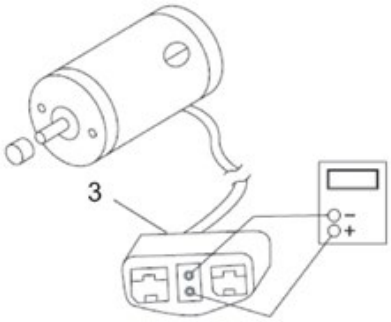
Note
This test should only be carried out on wheelchairs with conventional motor/transmission units.

Requirements:
- Phillips screwdriver size 2
- digital multimeter with resistance measurement

- Remove the rear panel as described in chapter 8.1.2.



- Pull the motor plug (3) out of the electronic module.



- Connect the digital multimeter to the adjacent central motor plug contacts (3) and measure the resistance between the contacts.
- If there is a defect, replace the motor and send it to Invacare® Service for inspection or repair.

Note
A resistance of between 40 and 80 ohms indicates an intact brake.

A resistance of 0 ohms or a very high resistance (mega-ohms or infinity) indicates a short-circuit, a bad connection or a defective brake.

CAUTION!

Material damage can be caused to the electronic module due to short-circuits in the electro-mechanical brake.

- *NEVER connect an electro-mechanical brake to an intact electronic module with a short-circuit!*
- *Always replace short-circuited brakes immediately.*

Note

A defective motor can damage the electronic module, but not the other way around.

8 Repair work

CAUTION!

Danger of injury and damage to property, if the maximum speed reduction on a wheelchair with a lifter does not function correctly!

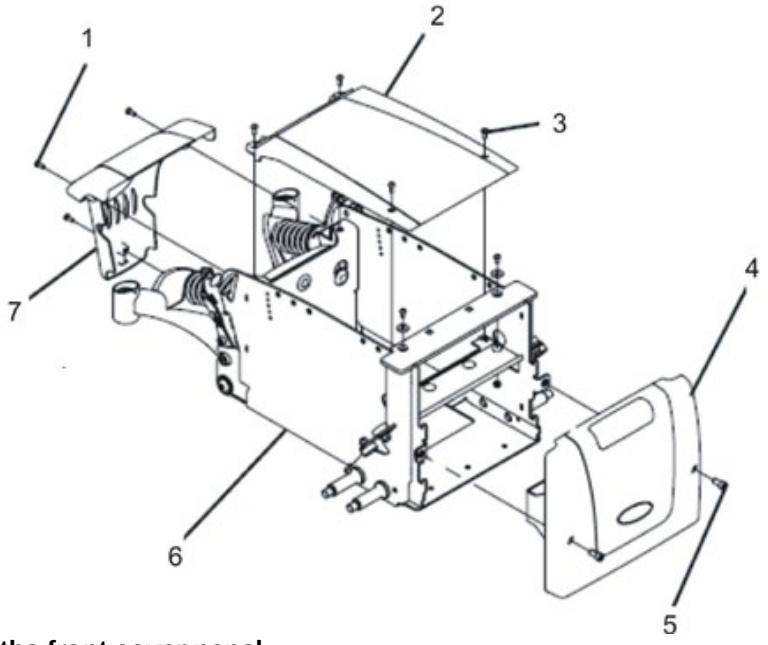
The wheelchair's control unit must reduce the maximum possible speed as soon as the lifter is raised.

- *Test the maximum speed reduction for correct function after any maintenance work or modifications to the wheelchair.*

8.1 Covers (TDX SP / TDX SP^{NB})

8.1.1 Opening the front panel

Requirements:
- Phillips screwdriver size 2
- 5/8" Allen key



Dismantling the front cover panel:

- Remove the legrests.
- Remove the two bolts (5) on the front cover panel (4) with a 5/8" Allen key.
- Pull the front cover panel upwards and remove it.

Refitting the front cover panel:

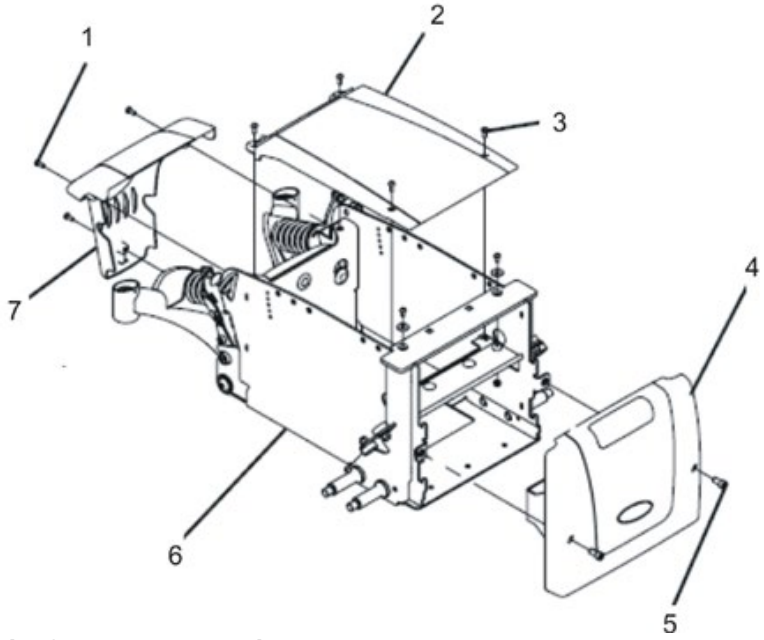
- Refit the parts in reverse order.
- Now tighten all the screws finger-tight again.

8.1.2 Opening the rear cover panel

8.1.2.1 Rear cover without an operating hours counter

Requirements:
- Phillips screwdriver size 2

Note
This chapter explains how to open the rear cover if no operating hours counter is installed. The procedure for opening the rear cover with an operating hours counter installed is described in chapter 8.1.2.2



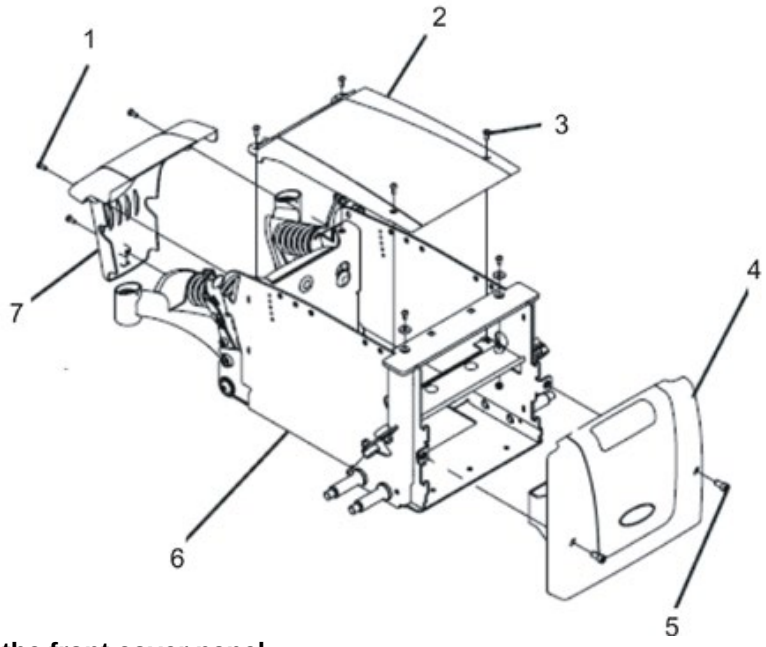
Dismantling the front cover panel:
- Undo the three Phillips screws (1) on the rear cover panel (7).
- Remove the rear cover panel.

Refitting the rear cover panel:
- Refit the parts in reverse order.
- Now tighten all the screws finger-tight again.

8.1.2.2 Rear cover with an operating hours counter

Requirements:
- Phillips screwdriver size 2

Note
This chapter explains how to open the rear cover if an operating hours counter is installed. The procedure for opening the rear cover with no operating hours counter installed is described in chapter 8.1.2.1.

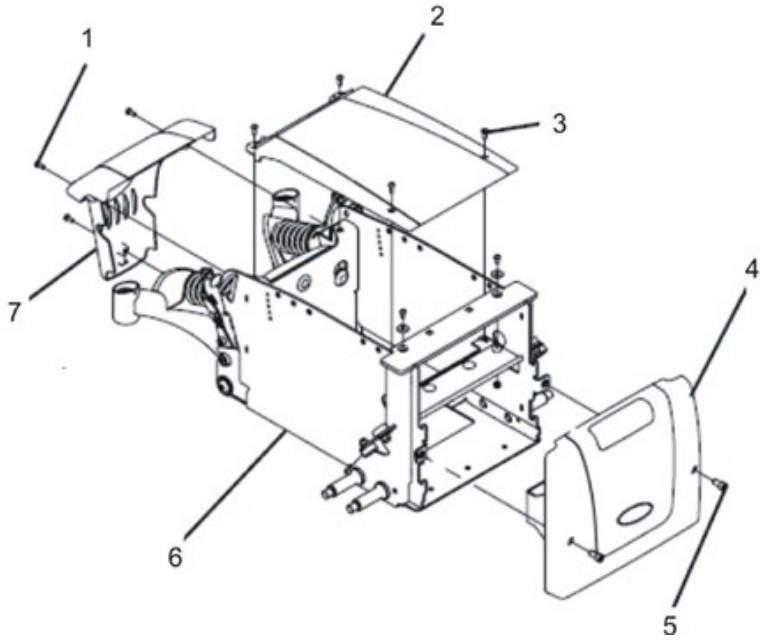


Dismantling the front cover panel:
- Undo the three Phillips screws (1) on the rear cover panel (7).
- Carefully loosen the rear cover. Pay attention to the cable of the operation hours counter.
- Take note of the positions of the cables and sockets. Mark the plugs and sockets or take a photo with a digital camera.
- Detach the cable of the operating hours counter from the drive motor.
- Remove the rear cover panel.

Refitting the rear cover panel:
- Refit the parts in reverse order.
- Now tighten all the screws finger-tight again.

8.1.3 Opening the top cover panel

Requirements:
- Phillips screwdriver size 2

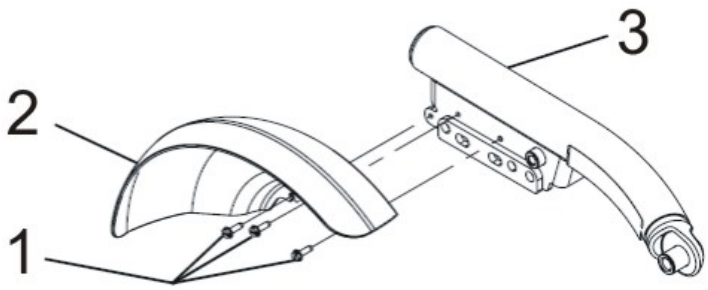


Dismantling the top cover panel:
- Remove the seat.
- Undo the four Phillips screws (3) on the top cover panel (2).
- Remove the top cover panel.

Refitting the top cover panel:
- Refit the parts in reverse order.
- Now tighten all the screws finger-tight again.

8.1.4 Replacing the splash guard

Requirements:
- 5/6“ Allen key
- 7/8“ Allen key
- two long wooden blocks, min. 14 x 14 x 30 cm
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 5 - 25 Nm (or similar)



Removing the splash guard:
- Remove the drive wheel as described in chapter 8.10.1.
- Undo and remove the three 5/6" Allen screws (1).
- Remove the splash guard (2) from the walking beam (3).

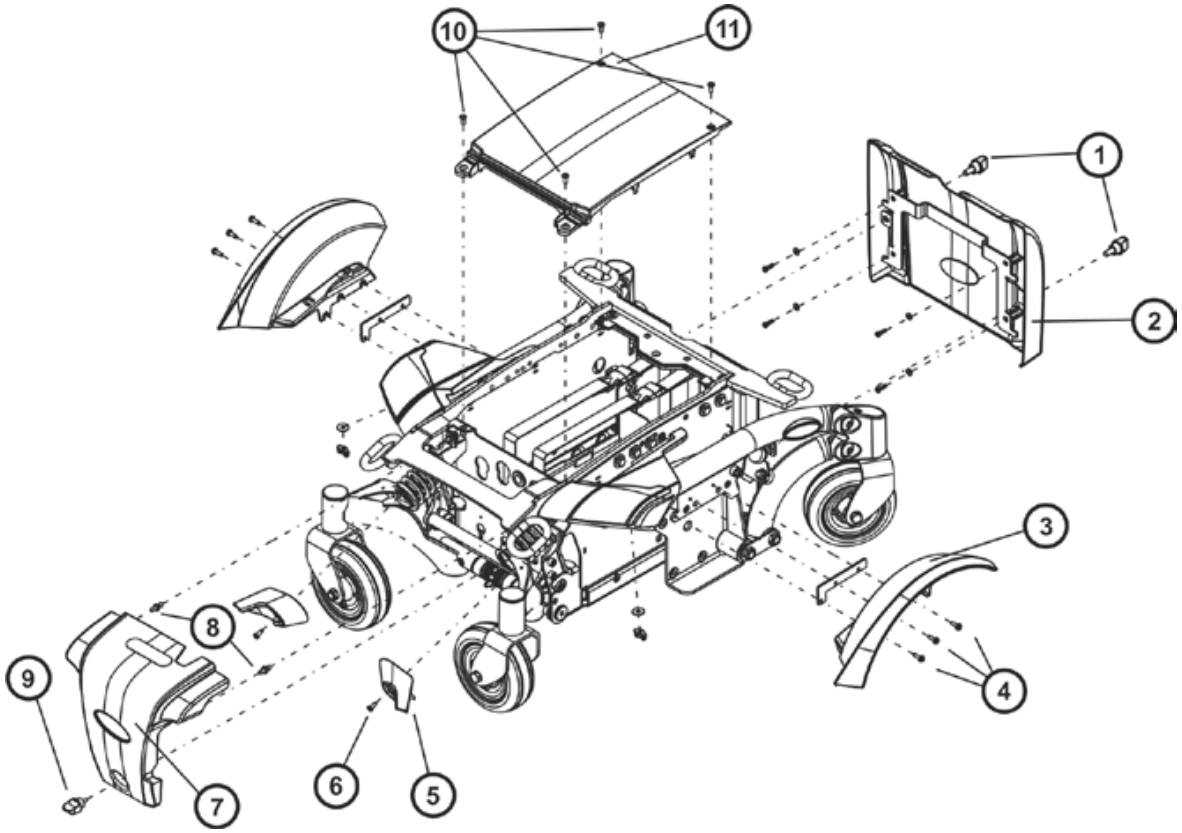
Refitting the splash guard:
- Refit the parts in reverse order.
- Tighten the splash guard screws to 4.5 Nm.

8.2 Covers (TDX SP2/ TDX SP2^{NB})

8.2.1 Opening the front panel

Requirements:
- 6 mm Allen key

Note
If the front cover panel is fitted with tommy bolts and not with Allen screws, you do not require any tools.



Dismantling the front cover panel:
- Remove the legrests.
- Remove both screws (1) n the ont cover panel (2).
- Pull the front cover panel upwards and remove it.

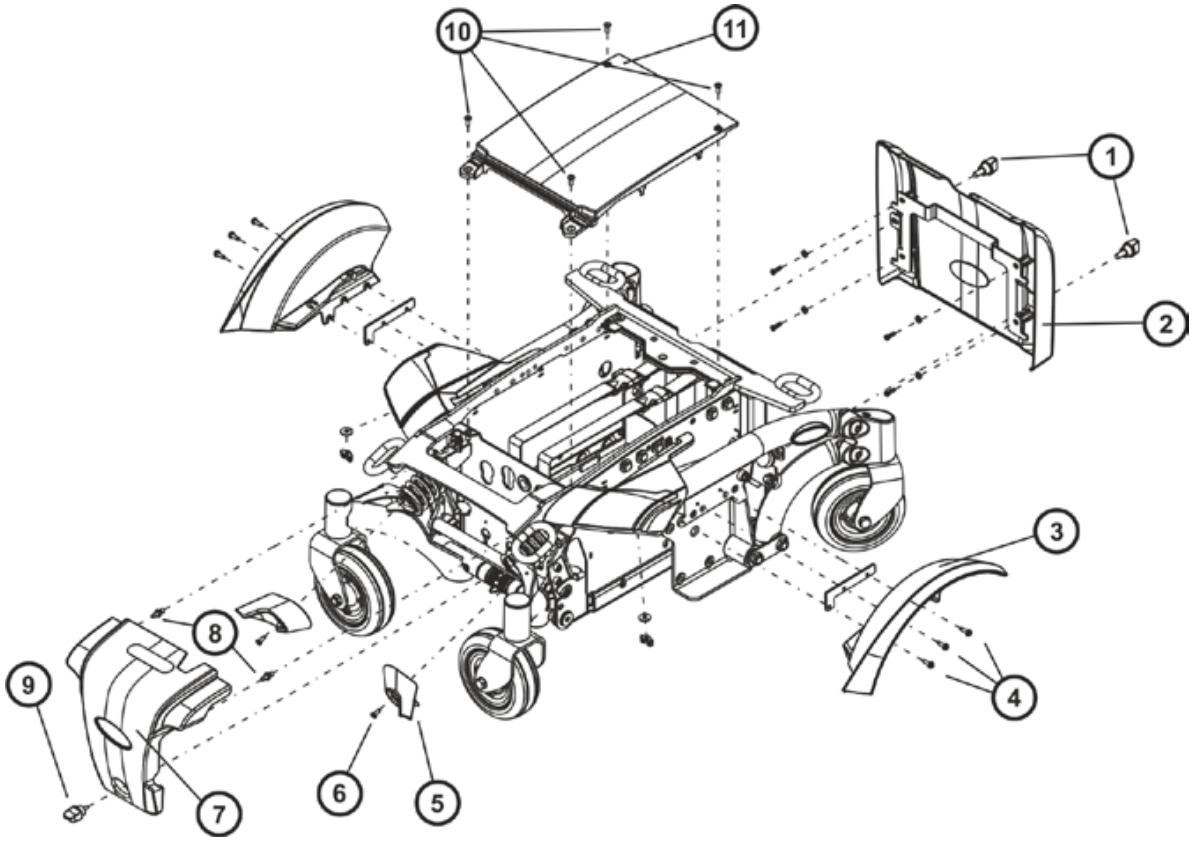
Refitting the front cover panel:
- Refit the parts in reverse order.
- Tighten all the screws finger-tight again.

8.2.2 Opening the rear cover panel

8.2.2.1 Rear cover without an operating hours counter

Requirements:
- Phillips screwdriver size 2

Note
This chapter explains how to open the rear cover if no operating hours counter is installed. The procedure for opening the rear cover with an operating hours counter installed is described in chapter 8.2.2.2.



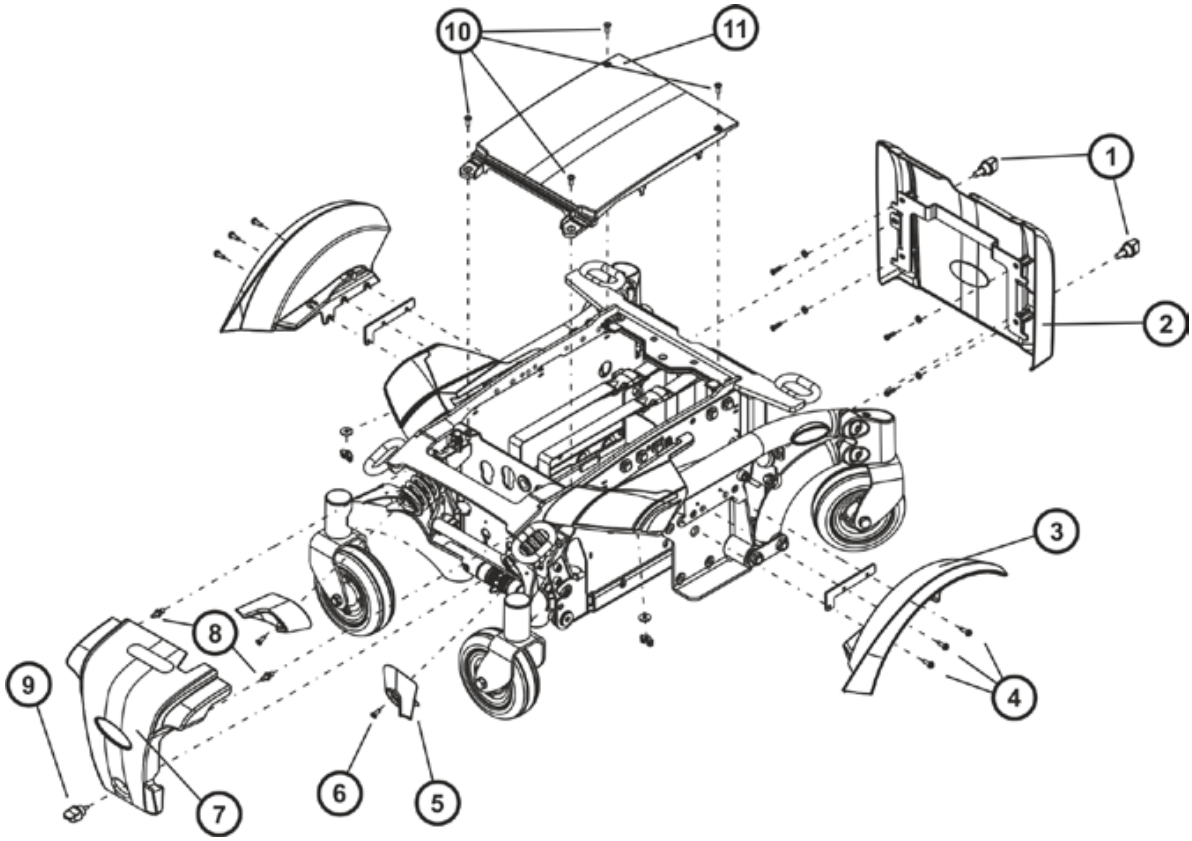
Dismantling the front cover panel:
- Loosen the Phillips screw (1) on the rear frame cover panel (5).
- Remove the rear cover panel from the frame.
- Loosen the thumb screw (9) of the rear cover panel (7)
- Remove the rear cover panel.

Refitting the rear cover panel:
- Refit the parts in reverse order.
- Tighten all the screws finger-tight again.

8.2.2.2 Rear cover with an operating hours counter

Requirements:
- Phillips screwdriver size 2

Note
This chapter explains how to open the rear cover if an operating hours counter is installed. The procedure for opening the rear cover with no operating hours counter installed is described in chapter 8.2.2.1.

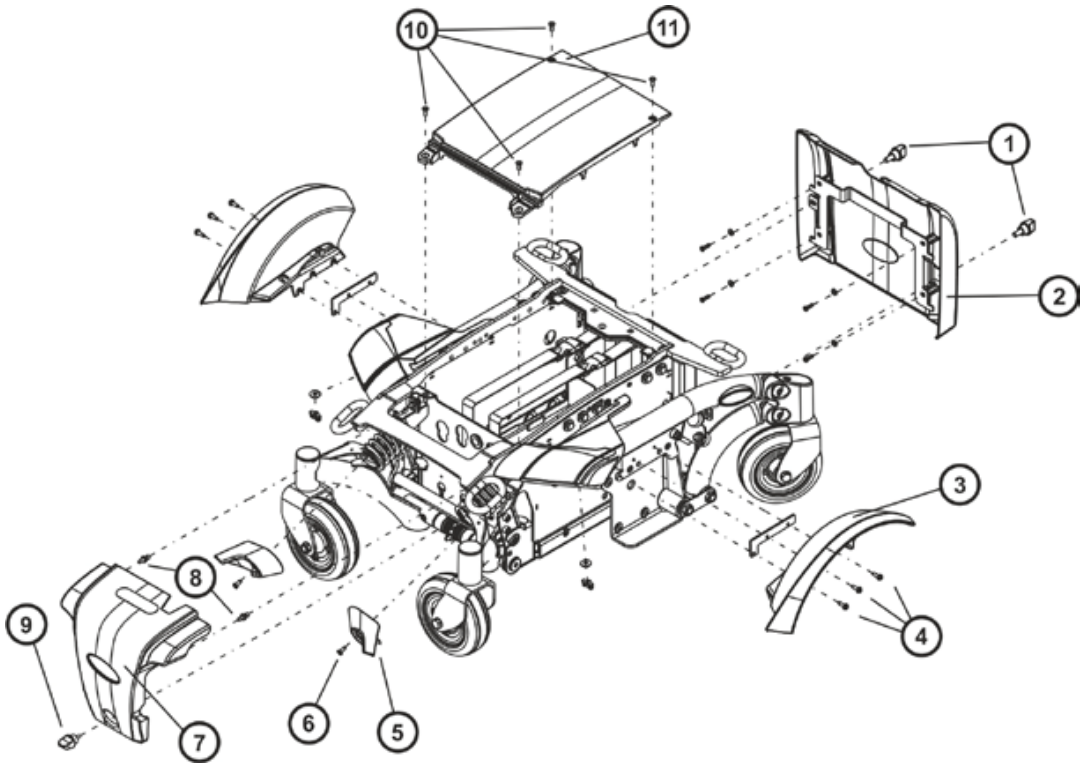


Dismantling the front cover panel:
- Loosen the Phillips screw (1) on the rear frame cover panel (5).
- Remove the rear cover panel from the frame.
- Loosen the thumb screw (9) of the rear cover panel (7)
- Carefully loosen the rear cover. Pay attention to the cable of the operation hours counter.
- Take note of the positions of the cables and sockets. Mark the plugs and sockets or take a photo with a digital camera.
- Detach the cable of the operating hours counter from the drive motor.
- Remove the rear cover panel.

Refitting the rear cover panel:
- Refit the parts in reverse order.
- Tighten all the screws finger-tight again.

8.2.3 Opening the top cover panel

Requirements:
- Phillips screwdriver size 2

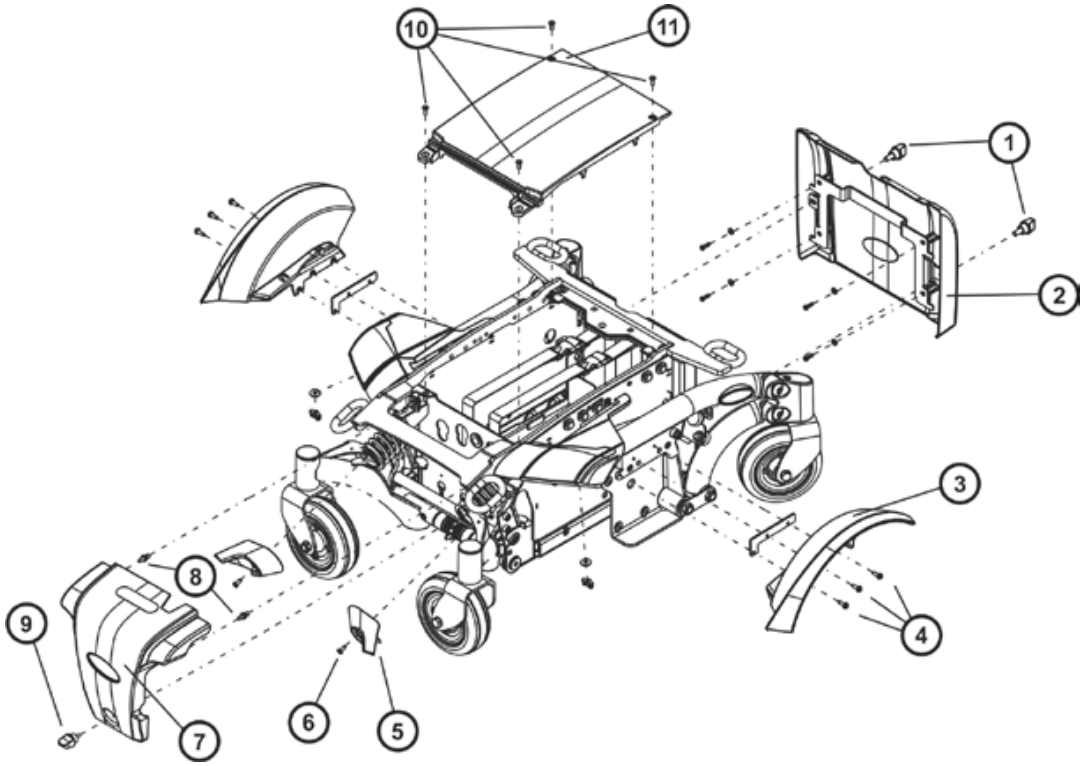


Dismantling the top cover panel:
- Remove the seat.
- Undo the four Phillips screws (10) on the top cover panel (11).
- Remove the top cover panel.

Refitting the top cover panel:
- Refit the parts in reverse order.
- Tighten all the screws finger-tight again.

8.2.4 Replacing the splash guard

Requirements:
- 6 mm Allen key
- two long wooden blocks, min. 14 x 14 x 30 cm
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 5 - 25 Nm (or similar)
- Flat screwdriver



Removing the splash guard:
- Remove the drive wheel as described in chapter 8.10.1.
- Undo and remove the three slotted screws (4).
- Remove the splash guard (3) from the walking beam.

Refitting the splash guard:
- Refit the parts in reverse order.
- Tighten the splash guard screws to 4.5 Nm.

8.3 Electronic module

8.3.1 Replacing the remote

Note
Replacing the remote is very easy and is not described in detail.
However, please note that when replacing an REM remote in connection with a DX, ACS or ACS2 electronic module, the subsequent selection of drive program should be carried out as described in chapter 8.3.3.

8.3.2 Replacing the electronic module

Note
However, please note that when replacing an REM remote in connection with a DX, ACS or ACS2 electronic module, the subsequent selection of drive program should be carried out as described in chapter 8.3.3.

The various electronic modules can be fitted to the wheelchair with a range different remotes. The possible electronic modules are described in chapter 4.2.

Replacement is described below using the ACS2 electronic module with optional lighting PCB and optional actuator module as an example. The procedure for other electronic modules is the same. The only difference is the plug positions.

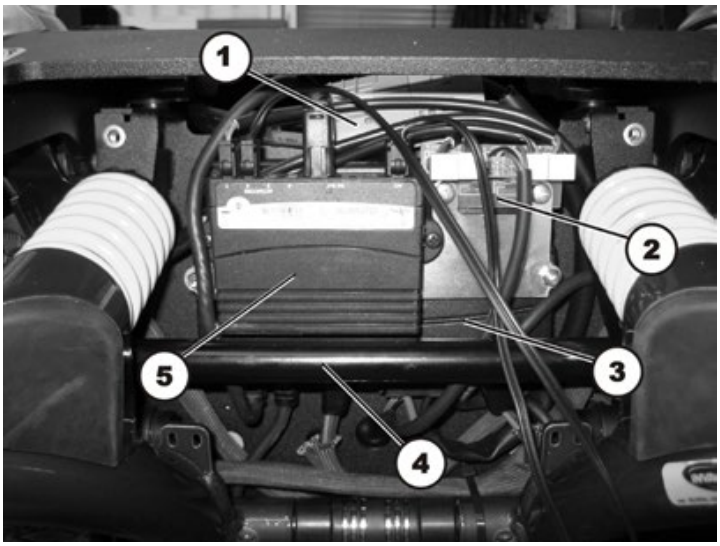
WARNING!
Any changes to the drive program can affect the driving characteristics and the tipping stability of the wheelchair!
- *Changes to the drive program may only be carried out by trained Invacare® specialist dealers!*
- *Invacare® can only give a warranty for safe wheelchair driving behaviour - especially tipping stability - for unaltered standard drive programs!*

Note
All electronic modules are delivered with a standard drive program. If you have carried out customer-specific modifications to the drive program, you will have to make these changes again after installing the new electronic module.

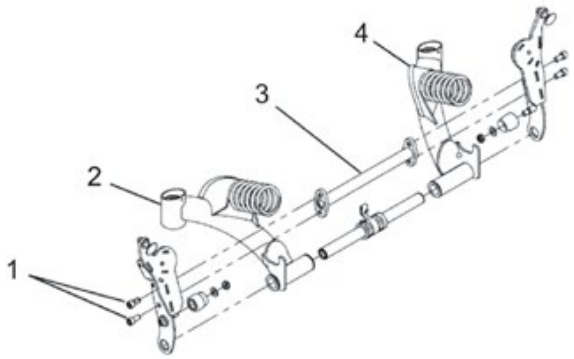
Requirements:
- 5/16“ Allen key
- Phillips screwdriver size 2
- socket spanner, 8 mm
- To adapt the drive program:
  programming software or hand programming device and system installation manual, available from Invacare®.

Removing the electronic module:

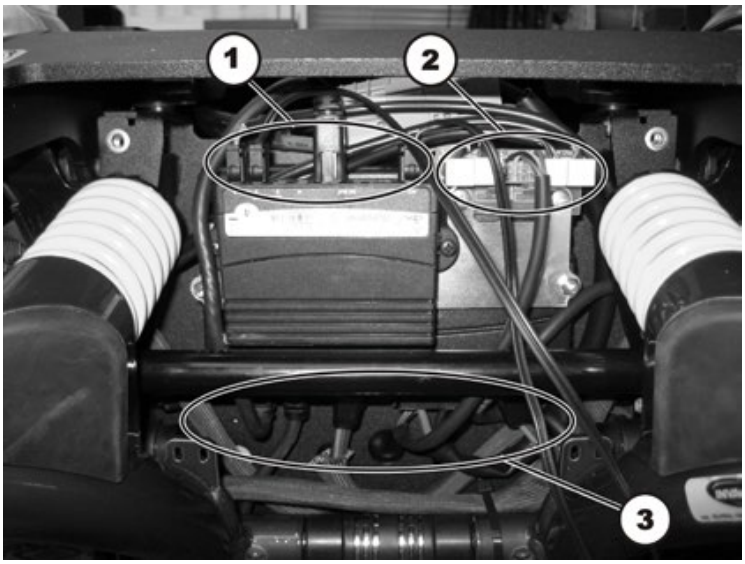
- Remove the rear panel as described in chapter 8.1.2.



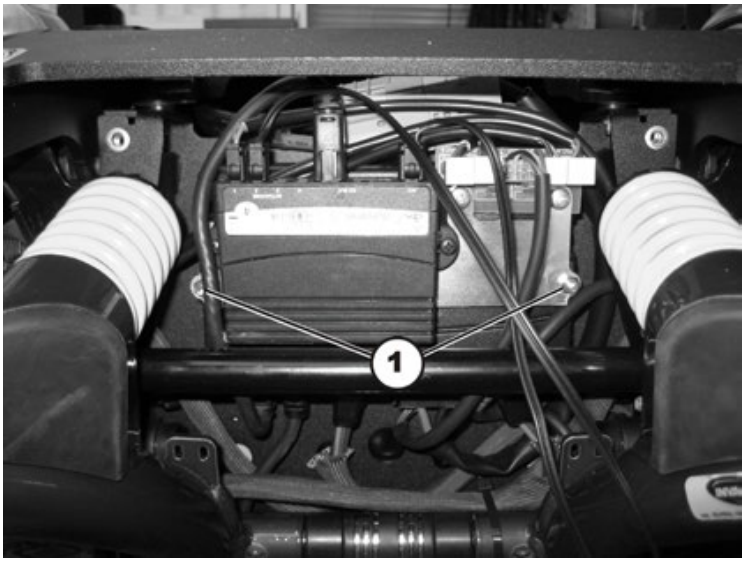
- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the optional lighting PCB (2) for the electronic module (3) and the optional actuator module (5).
- You can also see the optional cross connector between the rear wheel suspension (4).



- Dismantle the cross-connector (if fitted):
  Undo and remove the four Allen screws (1) with a 5/16" Allen key.
- Remove the cross-connector (3).



- Pull the plug (1) out of the actuator module.
- Pull the plug (2) out of the light module.
- Pull the plug (3) out of the electronic module.



- Loosen both the 8 mm nuts (1).
- Remove the module carefully.
- Replace the defective module.

Refitting the electronic module:

- Refit the various modules in reverse order.
- Refit the cross-connector if this is fitted.
- Plug all the plugs into their old positions.
- If you have replaced a DX, ACS or ACS2 Electronic module, select the drive programmatically in chapter 8.3.3.

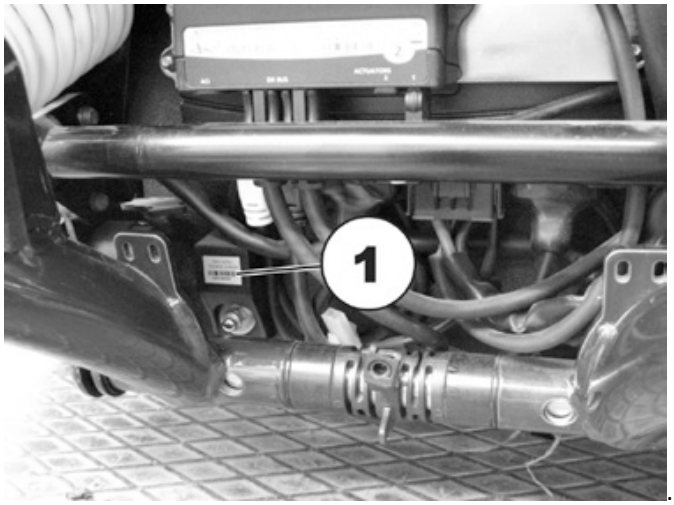
- If a new software version is available, update the drive program as described in chapter 8.4.
- Adapt the drive program using the programming software if necessary.
- To conclude, check all the wheelchair functions.

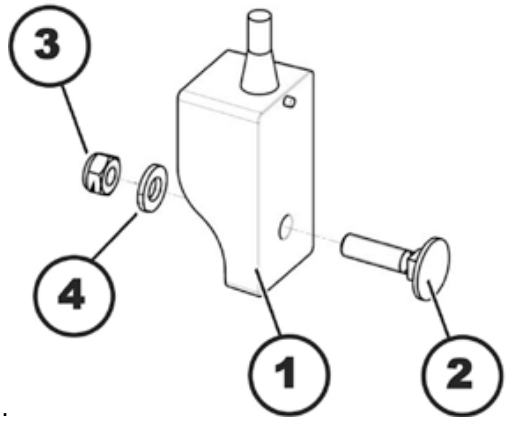
8.3.3 Replacing the G-Trac sensor

Requirements:
- 10 mm socket wrench

Uninstalling the G-Trac sensor:

- Switch the electronic of the wheelchair OFF.
- Remove the rear cover, as described in chapter 8.1.2.





- Take note of the positions of all cables and the sockets that they are connected to. Mark the connectors and sockets or take a photograph with a digital camera.
- Loosen and remove the self-locking nut (3), including the washer (4), with the 10 mm socket wrench.
- Remove the G-Trac sensor (1).
- Disconnect the cable of the G-Trac sensor from the electronic module.
- Replace the G-Trac sensor.

Installing the G-Trac sensor:

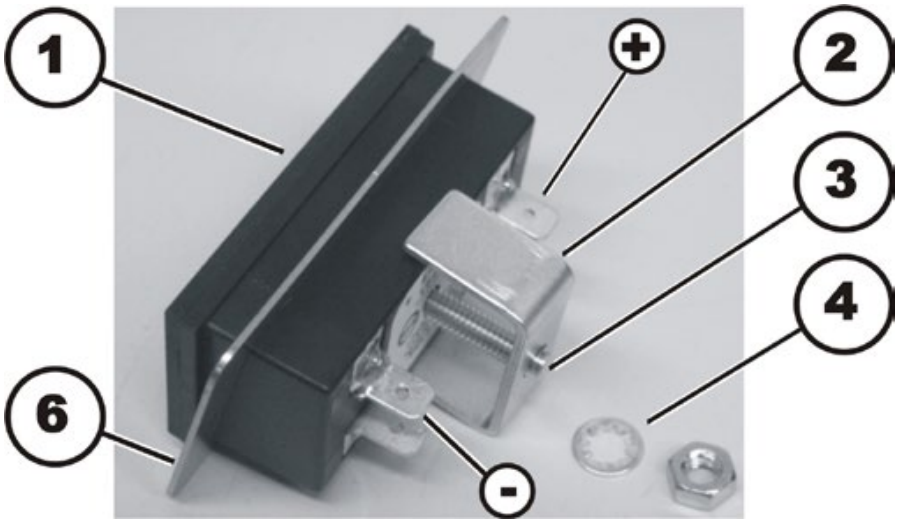
- Install the G-Trac sensor in reverse order.
- Re-connect the cable connector to the electronic module.
- The G-Trac sensor must be installed with the cable pointing upwards.
- Test all functions of the vehicle.

8.3.4 Replacing the operating hours counter / connecting cable

Requirements:
- 10 mm socket wrench

The operating hours counter is located on the rear cover (2).

Removing the operating hours counter:
- Switch the electronic system of the wheelchair off.
- Remove the rear cover as described in chapter 8.1.2.2 or 8.2.2.2.



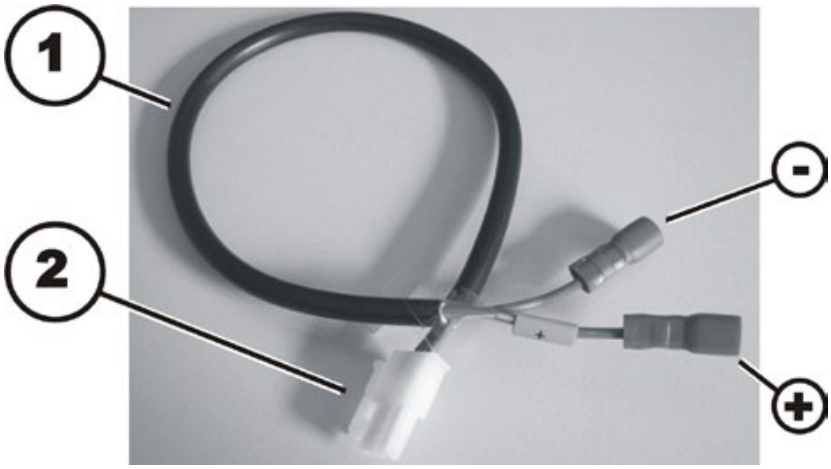
- Loosen and remove the nut (5) including the locking washer (4) using a 10 mm socket wrench.
- Pull the mounting bracket (2) off of the threaded rod (3).
- Remove the retaining frame (6).
- Pull the operating hours counter forwards out of the rear cover.
- Disconnect the two plugs of the cable (not shown in the illustration) from the pins (-) & (+).
- Replace the operating hours counter and cable respectively.

Installing an operating hours counter:

CAUTION!

Property damage can result if the counter is wrongly connected. If the plus and minus wires are connected the wrong way, it will damage the electronic components of the operating hours counter.

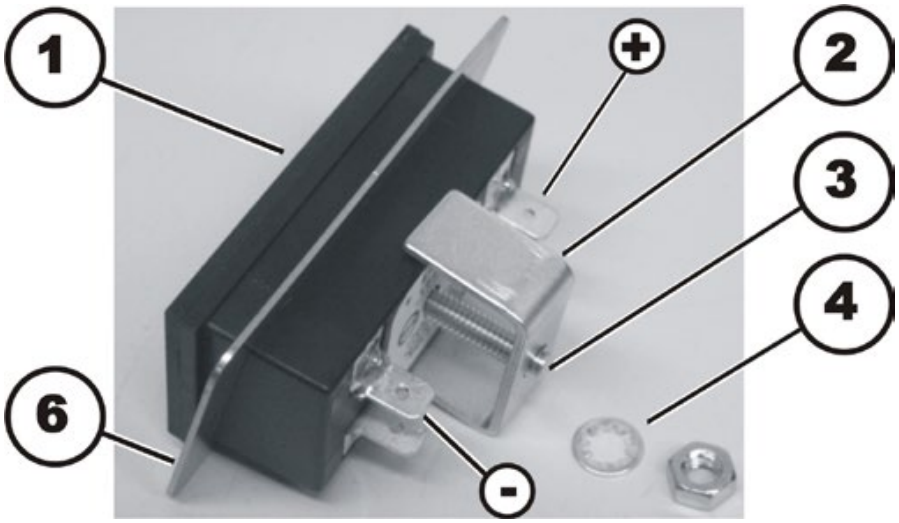
· *Make sure the cable is connected correctly.*



- Connect the plug on the blue wire (-) to the pin on the operating hours counter which is marked with a “minus” symbol.
- Connect the plug on the brown wire (+) to the pin on the operating hours counter which is marked with a “plus” symbol.

The brown wire is additionally marked with a yellow sleeve with a “plus” symbol on it.

- Insert the cable from the outside through the cut-out for the operating hours counter located in the rear cover.
- Position the operating hours counter in the cut-out.



- Reposition the retaining frame (6).
- Place the mounting bracket (2) on the threaded rod (3) so that the mounting bracket presses the retaining frame on the cover.

- Place the locking washer (4) and the nut (5) on the threaded rod.
- Tighten the nut hand-tight.
- Install the rear cover again as described in chapter 8.1.2.2 or 8.2.2.2.

8.3.5 Drive program selection after component replacement

The drive program is saved in the REM remote, and also in the DX, ACS or ACS2 electronic module. If one of these two components is replaced, the system must be told which of the components has not been replaced so that it knows which contains the current controller profile.

Note
The system allows normal usage of the wheelchair after component replacement only if the profile is selected afterwards.

8.3.5.1 Profile selection with remote REM A or REM B

- Plug the plug into the remote or the ACS2 controller.
- LEDs (1) and (4) blink.
- Use the bottom rocker switch (5) to select where the required controller profile is saved.
  LED 1 = remote
  LED 4 = ACS2 control system
- The relevant LED illuminates permanently, the other LED is off.
- Press the "Horn“ (2) and "+“ (3) buttons on the speed selection and hold them down for 3 seconds to confirm the selection.
- The system will switch itself off and restart automatically. During the process, the selected profile will be saved both in the remote and in the electronic module.

8.3.5.2 Profile selection with remote REM 550

- Plug the plug into the remote or the ACS2 controller.
- The display (2) shows that you need to select a profile.
- Use the bottom rocker switch (3) to select where the required controller profile is saved.
  I = remote
  II = electronic module
- The display will show which profile you have selected.
- Press the "Horn“ (4) and "+“ (1) buttons on the speed selection and hold them down for 3 seconds to confirm the selection.
- The system will switch itself off and restart automatically. During the process, the selected profile will be saved both in the remote and in the electronic module.

8.4 Updating the driving program

The driving programs for electric wheelchairs are continually updated and improved by Invacare®. For this reason, you should check whether the version number is still up to date each time a wheelchair comes in for repairs, and also during regular inspections.

If a newer version is available, the driving program must be updated. The procedure for updating the driving program is described in the user manual of the Wizard software.

Note
The electronic system is supplied with a standard drive program. If the driving program has been customised, you have to perform this customisation again, after installing the new driving program. This also applies to the customer-specific options of the seat setting for ACS2 remotes, which are activated ex works.

WARNING: Every alteration to the drive program can influence vehicle handling and the tipping stability of the wheelchair!

- *Alterations to the drive program must only be carried out by trained Invacare®-dealers!*
- *Invacare® can only assume a warranty for the safe vehicle handling of the wheelchair – in particular tipping stability - for unaltered standard drive programs!*

Pre-requisites:

- Dynamic® Wizard software
- User manual for the Wizard software
- For further information on other requirements - such as the minimum system configuration of the PC to be used for programming, necessary programming cables - see the user manual of the Wizard software.

Note
When an electrical adjustment option is retrofitted, such as electrical legrests, then this option needs to be activated in the driving program as well if you have an ACS2 remote. For more information, refer to the user manual of the Wizard software and the installation instructions for the electronic modules

8.5 Batteries, cables & battery charger

8.5.1 Making the batteries accessible

ATTENTION!

Injury hazard and possible material damages if batteries are handled improperly!

- *The installation of new batteries may only be carried out by authorised specialists.*
- *Observe the warning information on the batteries.*
- *Only use battery versions stated in the specifications.*

ATTENTION!

Fire and burns hazard if battery terminal is bypassed!

- *Please take great care to ensure that the battery terminals are never short-circuited with tools or mechanical mobility device parts!*
- *Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.*

ATTENTION: Danger of crushing!

The batteries are extremely heavy. This results in injury hazards to your hands.

- *Bear in mind that the batteries are sometimes very heavy!*
- *Please handle the batteries with care.*

WARNING: BURN HAZARD!

Injury hazard due to discharged acid.

- *Always wear acid-proof protective gloves when handling batteries.*
- *Always wear protective goggles when handling batteries.*

What to do if acid is discharged:

- *Always take clothing which has been soiled by or dipped in acid off immediately!*
- *Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!*

If contact with eyes is made:

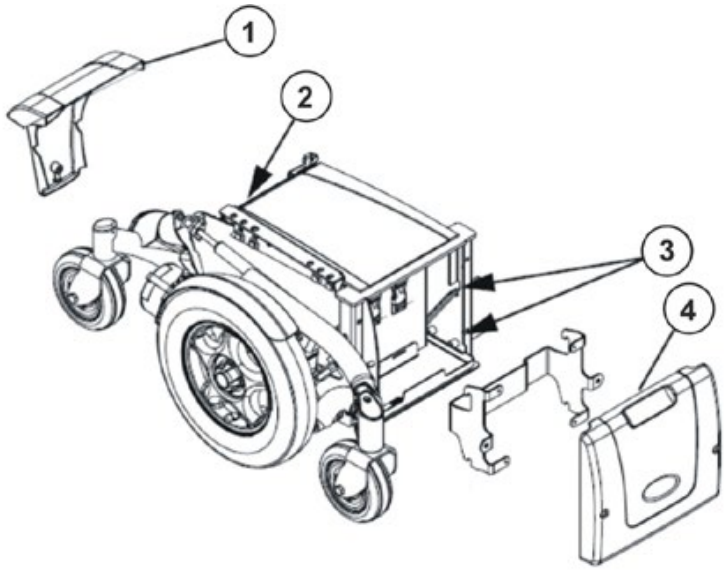
- *Rinse the affected eye under running water for several minutes! You should also consult an eye specialist immediately afterwards!*

Requirements:

- Phillips screwdriver size 2
- 5/8“ Allen key
- socket spanner, 11 mm

Note

When disassembling, take care of small parts such as screws and washers. Put all small parts down so that they can be reassembled in the right sequence.



- Remove the legrests.
- TDX SP / TDX SP^{NB}:

  Remove the front (4) and rear (1) cover panels as described in the chapters 8.1.1 and 8.1.2.
- TDX SP2 / TDX SP2^{NB}

  Remove the front (4) and rear (1) cover panels as described in the chapters 8.2.1 und 8.2.2.
- Disconnect the battery plugs (2).
- Pull the battery carrier forwards as far as the stop.
- Only on the TDX SP^{NB} /TDX SP2^{NB}:
  Disconnect the plug-in connection between the batteries before removing them.

8.5.2 Replacing batteries (TDX SP / TDX SP2)

ATTENTION:

Injury hazard and possible material damages if batteries are handled improperly!

- *The installation of new batteries may only be carried out by authorised specialists.*
- *Observe the warning information on the batteries.*
- *Only use battery versions stated in the specifications.*

ATTENTION:

Fire and burns hazard if battery terminal is bypassed!

- *Please take great care to ensure that the battery terminals are never short-circuited with tools or mechanical mobility device parts!*
- *Ensure that the battery terminal caps have been replaced if you are not working on the battery terminals.*

ATTENTION: Danger of crushing!

The batteries are extremely heavy. This results in injury hazards to your hands.

- *Bear in mind that the batteries are sometimes very heavy!*
- *Please handle the batteries with care.*

WARNING: BURN HAZARD!

Injury hazard due to discharged acid.

- *Always wear acid-proof protective gloves when handling batteries.*
- *Always wear protective goggles when handling batteries.*

What to do if acid is discharged:

- *Always take clothing which has been soiled by or dipped in acid off immediately!*
- *Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!*

If contact with eyes is made:

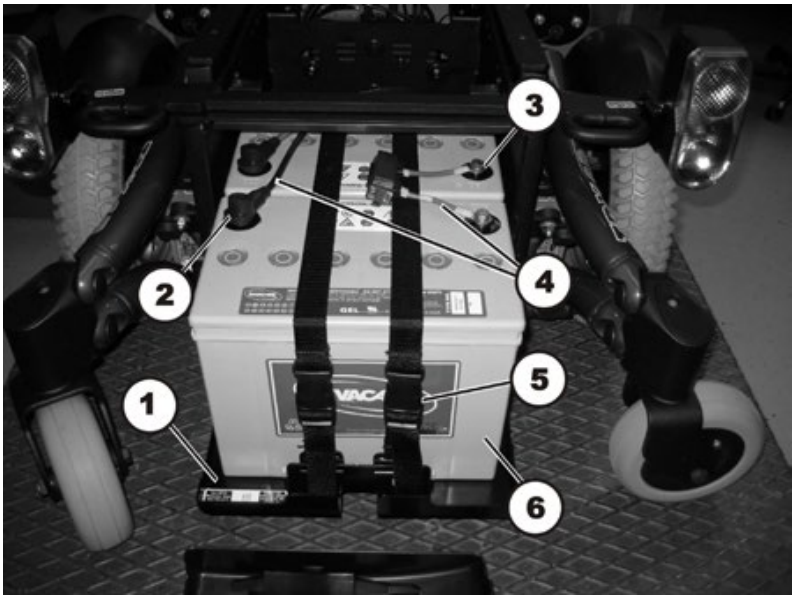
- *Rinse the affected eye under running water for several minutes! You should also consult an eye specialist immediately afterwards!*

Requirements:

- Phillips screwdriver size 2
- 5/8“ Allen key
- socket spanner, 11 mm

Removing the batteries:

- Make the batteries accessible as described in chapter 8.5.1.



- Remove the terminal caps.
- Remove the terminal bolts (3) with an 11 mm socket spanner. First remove the negative terminal bolt. After this, you can remove the positive terminal bolt.
- Remove the connection cable (4) and the connection cable with the main fuse (4).
- Open the battery strap (5).
- Lift the batteries (6) out of the battery carrier (1).

Refitting the batteries:

- Refit the batteries in reverse order.
- Ensure that the battery cage sockets/plugs have been correctly refitted. A polarity diagram is located in the battery case cover.

8.5.3 Replacing batteries / replacing battery cables (TDX SP^{NB} / TDX SP2^{NB})

Note
To replace the fuse, the battery cable with the fuse attached to it must be replaced.

CAUTION:

Danger of injury and danger of damage to property if the batteries are handled incorrectly!

- *The installation of new batteries may only be performed by authorised technicians.*
- *Pay attention to the warning notes on the batteries.*
- *Only use the battery type defined in the technical specifications.*

CAUTION:

Risk of fire and burns if battery terminals are short-circuited!

- *Take special care that the battery terminals are NOT short-circuited with a tool or metallic components of the wheelchair!*
- *Make sure that the battery terminal caps are fitted to the battery terminals at all times if you are not working on them.*

CAUTION: Danger of crushing!

The batteries are very heavy. There is a danger that you may injure your hands.

- *Take into account the heavy weight of the batteries.*
- *Handle the batteries carefully.*

WARNING: Risk of chemical burns!

Danger of injury by leaking acid.

- *Wear acid-resistant protective gloves when handling batteries.*
- *Wear protective goggles when handling batteries.*

How to deal with a battery acid leak:

- *Remove clothes that have been soiled or soaked with acid immediately!*
- *Immediately wash the affected area of skin that has come into contact with battery acid with lots of water!*

After contact with eyes:

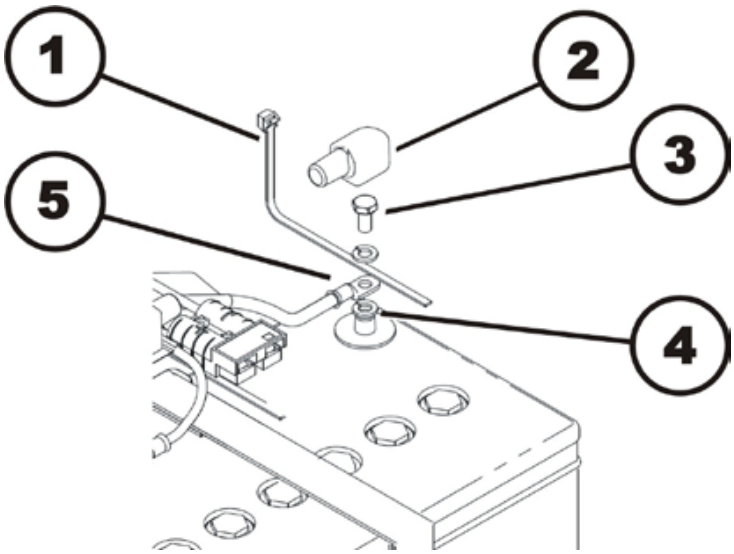
- *Immediately rinse eyes under running water for several minutes! Consult an eye doctor immediately afterwards!*

Requirements:

- 11 mm socket wrench
- Side cutting pliers
- Cable ties

Uninstalling batteries/battery cables:

- Remove the batteries, as described in chapter 8.5.1.



Positive terminal (+):

- Remove the cable ties (1) with side cutting pliers.
- Lift the battery terminal cap (2) off and move it up the cable and out of the way.
- Use an 11 mm socket wrench to loosen the battery terminal screw (3).
- Remove the battery terminal screw together with both washers and the cable lug (5) from the battery terminal (4).

Negative terminal (-):

- Repeat the steps of the procedure for the positive terminal on the negative terminal of the battery.
- Replace the batteries and/or the battery cables.

Installing batteries/battery cables:

- Assemble the parts in reverse order. Connect the negative terminal first, then the positive terminal.
- Make sure the battery box sockets and plugs are correctly installed. A schematic showing the correct positions can be found in the battery box cover.
- Carefully reposition the battery terminal caps and secure them with a cable tie to prevent them from possibly slipping out of place.

8.5.4 Correct handling of damaged batteries

WARNING: BURN HAZARD!

Injury hazard due to discharged acid.

- *Always wear acid-proof protective gloves when handling batteries.*
- *Always wear protective goggles when handling batteries.*

What to do if acid is discharged:

- *Always take clothing which has been soiled by or dipped in acid off immediately!*
- *Rinse any areas of your skin which has come into contact with battery acid off immediately with plenty of water!*

If contact with eyes is made:

- *Rinse the affected eye under running water for several minutes! You should also consult an eye specialist immediately afterwards!*

Requirements:

- protective goggles
- acid-proof gloves
- acid-proof transport container

- If handling damaged batteries, always wear suitable protective clothing.
- Always deposit damaged batteries in suitable acid-proof containers immediately after removal.
- Only transport damaged batteries in suitable acid-proof containers.
- Always wash any objects which were contacted by acid in plenty of fresh water.

Always dispose used or damaged batteries correctly

Used and damaged batteries will be taken back by your medical equipment supplier or Invacare®.

8.5.5 Checking and replacing the main fuse (TDX SP /TDX SP2)

CAUTION: Fire hazard!

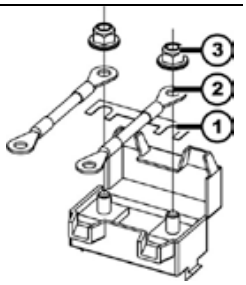
A short circuit can cause extremely high currents which can result in spark formation and fire!

- *Always use an original strip fuse with the approved amperage.*
- *If the main fuse has blown, first rectify the cause before fitting a new one.*

CAUTION: Fire hazard!

Fitting the incorrect strip fuse causes a fire hazard!

- *Only fix the strip fuses in the sequence shown in the image on the right!*
- *Tighten the nuts with 3.3 or 3.5 Nm!*



1. Strip fuse
2. Spade terminal
3. DIN 6923 nut

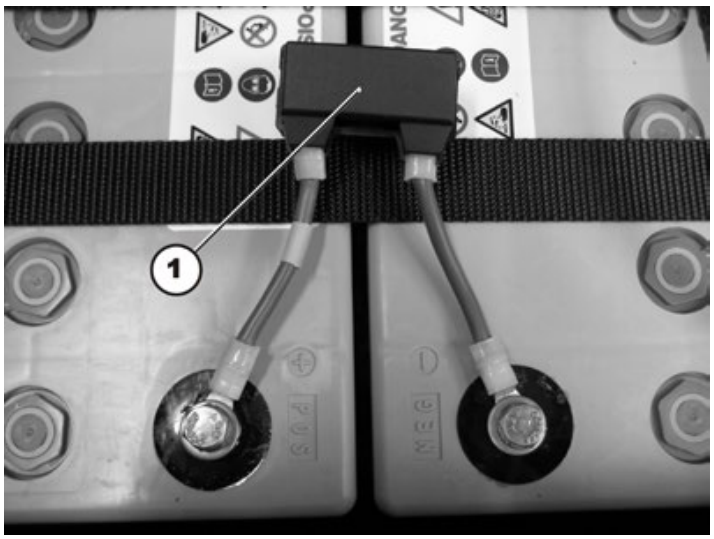
Requirements:

- 5/8“ Allen key
- Phillips screwdriver size 2
- socket spanner, 8 mm
- torque wrench 0-20 Nm (or similar)

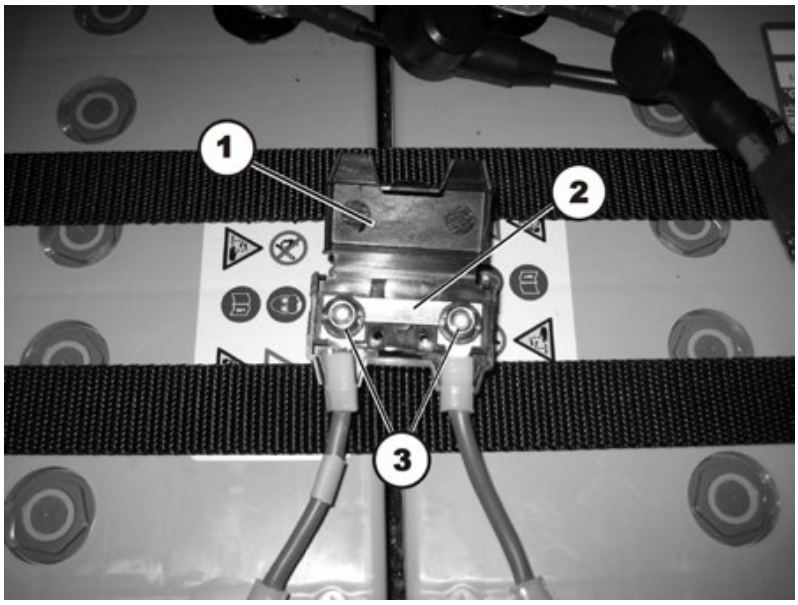
Note
If the fuseholder is damaged, you can replace this complete with the battery cables.

Dismantling the main fuse:

- Remove the battery compartment cover, disconnect the battery plugs and pull the batteries out of the battery compartment as described in chapter 8.5.1.



- The fuseholder (1) is located on top of the batteries.
- Open the fuseholder cover.



- You will be able to see the strip fuses (2) once the fuse holder (1) is open.
- If the strip fuse has blown, you must first ascertain and rectify the cause of the fault.
- The main fuse may only be replaced once the fault has been rectified.
- Remove the strip fuse nuts (3) with an 8 mm socket spanner.
- Replace the strip fuse.

Fitting the main fuse:

- Refit all the parts again in reverse order.
- To conclude, check all the wheelchair functions.

8.5.6 Replacing the main fuse (TDX SP^{NB} / TDX SP2^{NB})

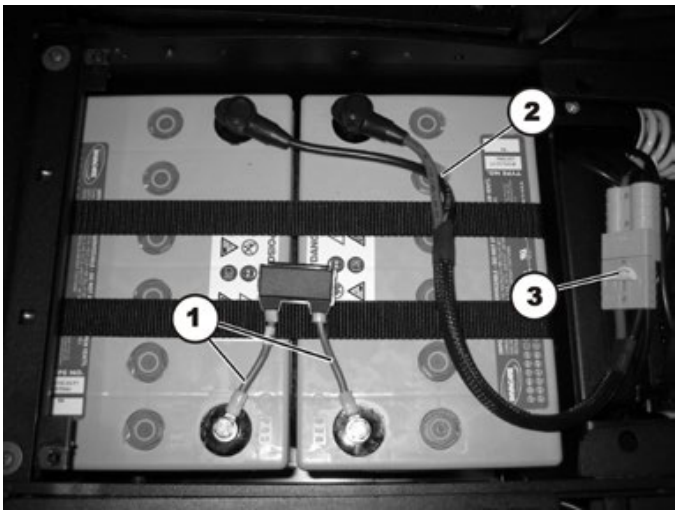
Note
To replace the fuse, the battery cable with the fuse attached to it must be replaced.

- Replace the battery cables, as described in chapter 8.5.3.

8.5.7 Checking the cable

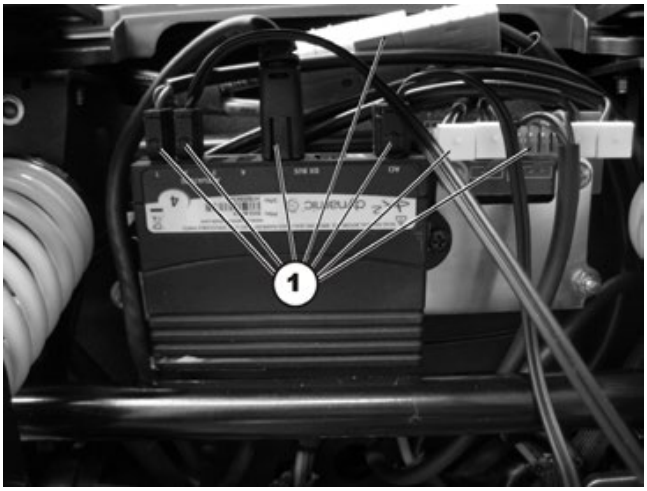
Requirements:
- 5/8“ Allen key
- Phillips screwdriver size 2
- oblique pliers
- cable ties

- Remove the cover panels, disconnect the battery plugs and pull the batteries out of the battery compartment as described in chapter 8.5.1.



- Check the fuse cable (1), battery cable (2) and the battery plug (3) for visible damage and crushing locations.
- Replace any damaged cables.

Note
The following figure shows checking of the cables using the ACS electronic module as an example. The position of the plugs is different for other electronic modules. The procedure for checking is otherwise identical.
The position of the plugs is described in chapter 4.2.

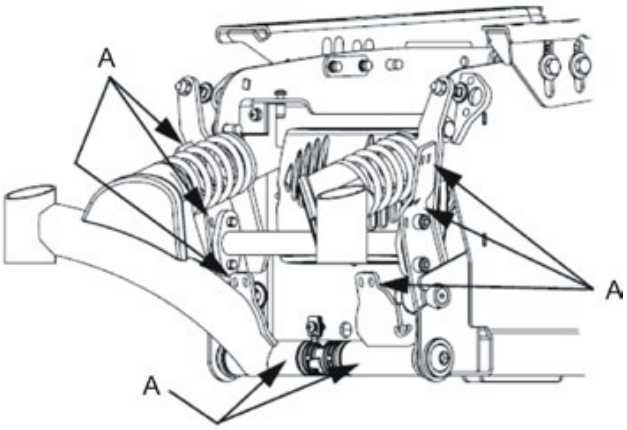


- Check all cables for visible damage and crushing locations. Replace any damaged cables.
- Pull each plug (1) carefully. The plug should not come out of the socket.
- If one of the plugs is loose, press it back into the socket with light pressure. The plug must engage.
- Checked to ensure that the plug is now firmly in its socket. If not, repeat the previous operation.
- Refit the parts in reverse order.
- Check all vehicle functions.

8.5.8 Cable routing

Requirements:
- Phillips screwdriver size 2
- oblique pliers
- cable ties

- Remove the rear panel as described in chapter 8.1.2 or 8.2.2.



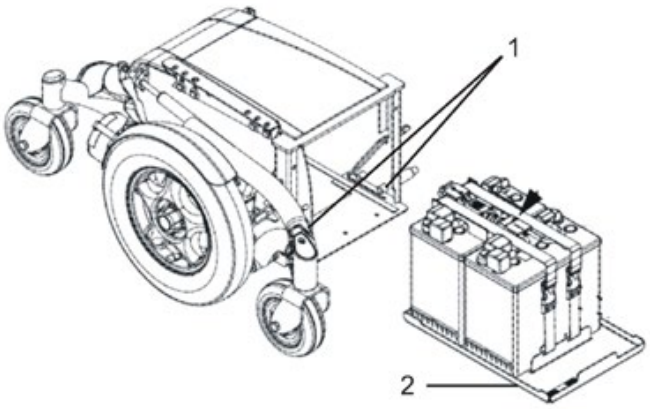
- When routing cables in the rear section, please ensure that the rear wheel stabilisers are movable.
- Fix the cable with cable ties at the locations marked (A).
- Make sure the cable has enough play so that all movable parts can move freely without stretching, clamping or abrading the cable.
- Route the cable in the same manner underneath the seat and the control panel.

8.6 Battery carrier

Requirements:
- Phillips screwdriver size 2
- 5/8“ Allen key
- 5/32“ Allen key

Dismantling the battery carrier:

- Make the batteries accessible as described in chapter 8.5.1.
- Remove the batteries as described in chapter 8.5.2/8.5.3.



- Remove the two stop bolts (1) with a 5/32 Allen key.
- Pull the battery carrier (2) out of the battery case.

Refitting the battery carrier:

- Refit the parts in reverse order.

8.7 Replacing the battery case

Requirements:
- 5/6“ Allen key
- 5/32“ Allen key
- Phillips screwdriver size 2
- blade screwdriver
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 5 - 25 Nm (or similar)
- torque wrench 20 - 80 Nm (or similar)
- oblique pliers
- cable ties
- M8 washer
- two long wooden blocks, min. 14 x 14 x 30 cm

Removing the battery case:
- Remove the seat including seat support as described in chapter 8.18 and 8.20 (Modulite).
- Remove the covers as described in chapter 8.1 or 8.2.
- Remove the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.
- Remove the battery support as described in chapter 8.6.
- Remove the front headlights and rear lights depending on version (including bracket) as described in chapter 8.8.
- Remove the electronic module as described in chapter 8.3.2.
- Remove the bottom walking beams as described in chapter 8.13.
- Remove the top walking beams as described in chapter 8.14.
- Remove the gas cylinder as described in chapter 8.24.1.
- Remove rear wheel suspension as described in chapter 8.11.
- Remove the front and rear bulbholders depending on version as in chapter 8.8.
- Remove the rubber bumper as described in chapter 8.16.
- Replace the battery case.

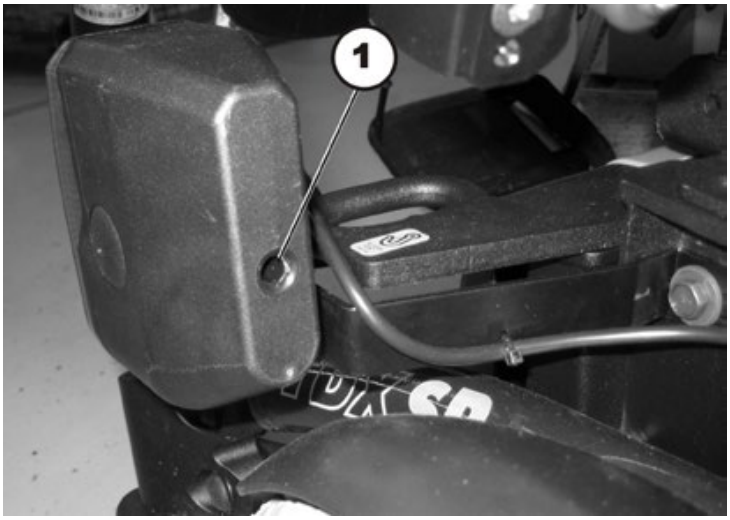
Refitting the battery case:
- Refit the rubber bumper as described in chapter 8.16.
- Refit the front and rear bulbholders depending on version as in chapter 8.8.
- Refit rear wheel suspension as described in chapter 8.11.3.
- Refit the gas cylinder as described in chapter 8.24.3.
- Refit the top walking beams as described in chapter 8.14.2.
- Refit the bottom walking beams as described in chapter 8.13.
- Refit the electronic module as described in chapter 8.3.2.
- Refit the front and rear lights including bracket depending on version as in chapter 8.8.
- Refit the battery support as described in chapter 8.6.
- Replace the batteries in their correct location as described in chapters 8.5.2/8.5.3 and 8.5.1.
- Refit the the covers as described in chapter 8.1 or 8.2.
- Refit the seat including seat support as described in chapter 8.18 and 8.20 (Modulite).

- Adjust the setting screw on the stability lock system as described in chapter 8.24.5.
- To conclude, carry out an extensive driving and function test with the wheelchair.

8.8 Lighting unit

8.8.1 Replacing the front bulb (conventional lighting system)

Requirements:
- Phillips screwdriver size 2



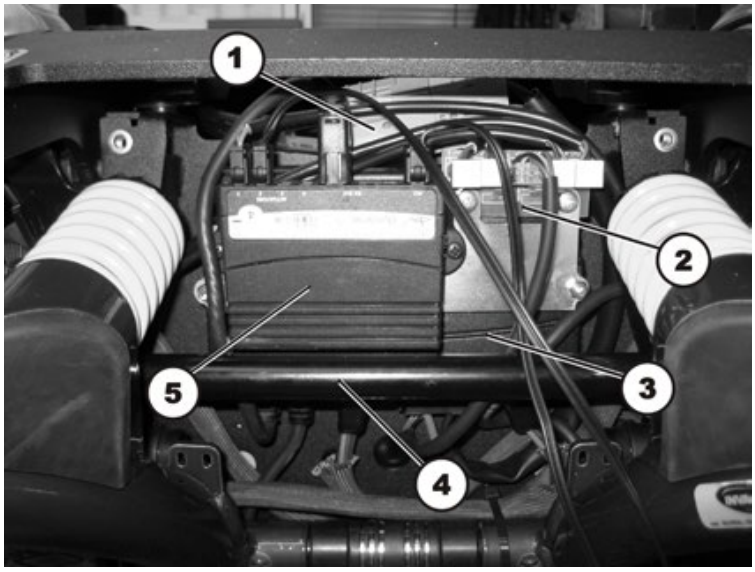
- Undo the concealed Philips screw on the rear of the headlight/indicator combination.
- Remove the transparent plastic cover.
- Replace the defective bulb.
- Close the cover and tighten the Philips screw finger-tight.

8.8.2 Replacing the front headlight complete (conventional lighting system)

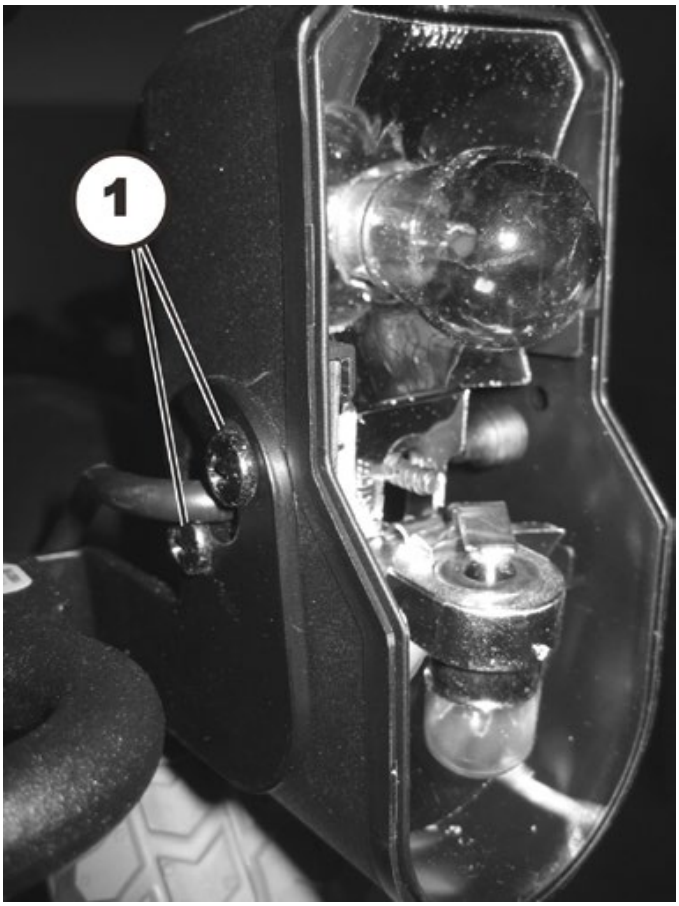
Requirements:
- Phillips screwdriver size 2
- oblique pliers
- cable ties

Removing the front headlight:

- Remove the rear panel as described in chapter 8.1.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the front headlight affected.
- Remove all cable ties and pull the cable out of the wheelchair.



- Undo and remove the two Phillips screws which hold the front headlight.
- Replace the headlight unit.

Refitting the front headlight:

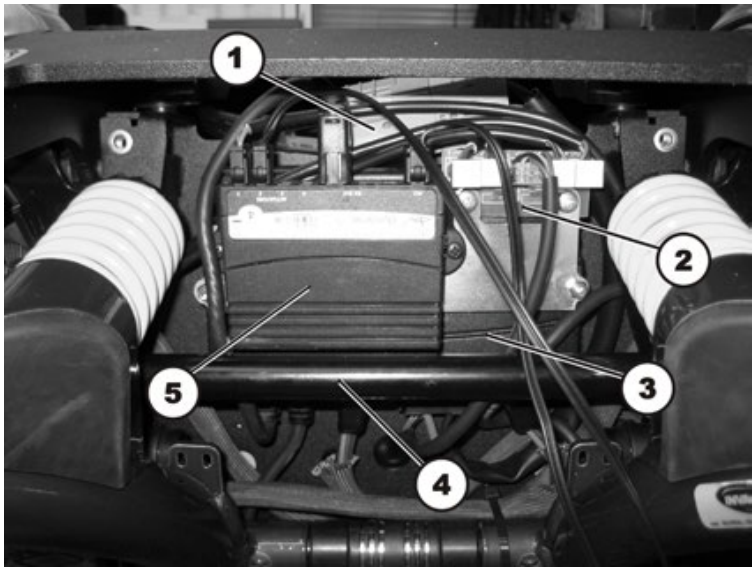
- Refit the parts in reverse order. Route the cables carefully and fix them with cable ties.
- Check all vehicle functions.

8.8.3 Replacing the front headlight complete- TDX SP2 (LED lighting system)

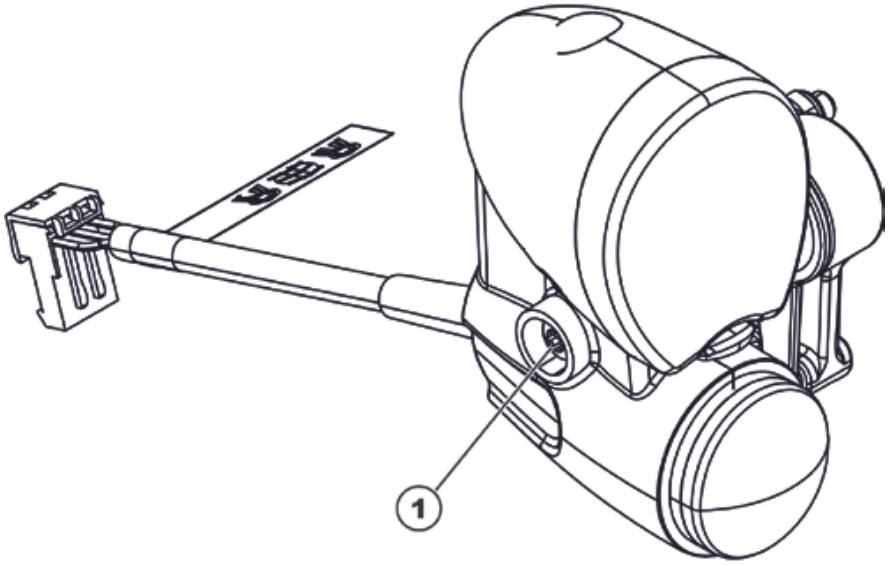
Requirements:
- Allen key 4 mm
- oblique pliers
- cable ties

Removing the front headlight:

- Remove the rear panel as described in chapter 8.2.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the front headlight affected.
- Remove all cable ties and pull the cable out of the wheelchair.



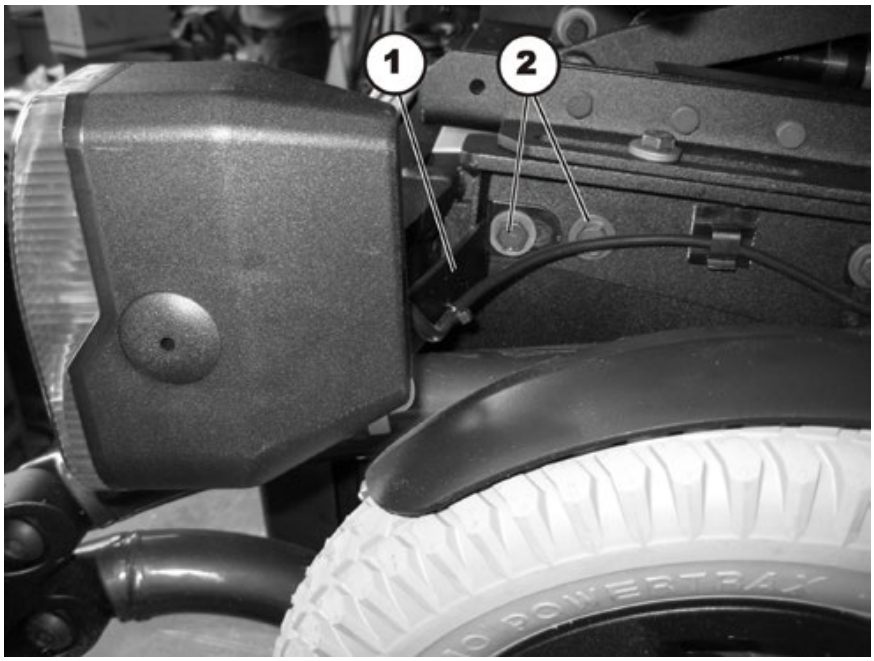
- Loosen the Allen screw (1) with a 4 mm Allen key and remove the front bulb from the mounting.
- Replace the headlight unit.

Refitting the front headlight:

- Refit the parts in reverse order.
- Route the cables carefully and fix them with cable ties. In doing so, please pay attention to chapter 8.5.8.
- Check all vehicle functions.
- Now tighten all the screws finger-tight again.
- Check all vehicle functions.
- Adjust the headlight roughly using the grid. The user can carry out the final adjustment following the operating manual.

8.8.4 Replacing the front bulbholder (conventional lighting system)

Requirements:
- Phillips screwdriver size 2
- socket spanner, 13 mm

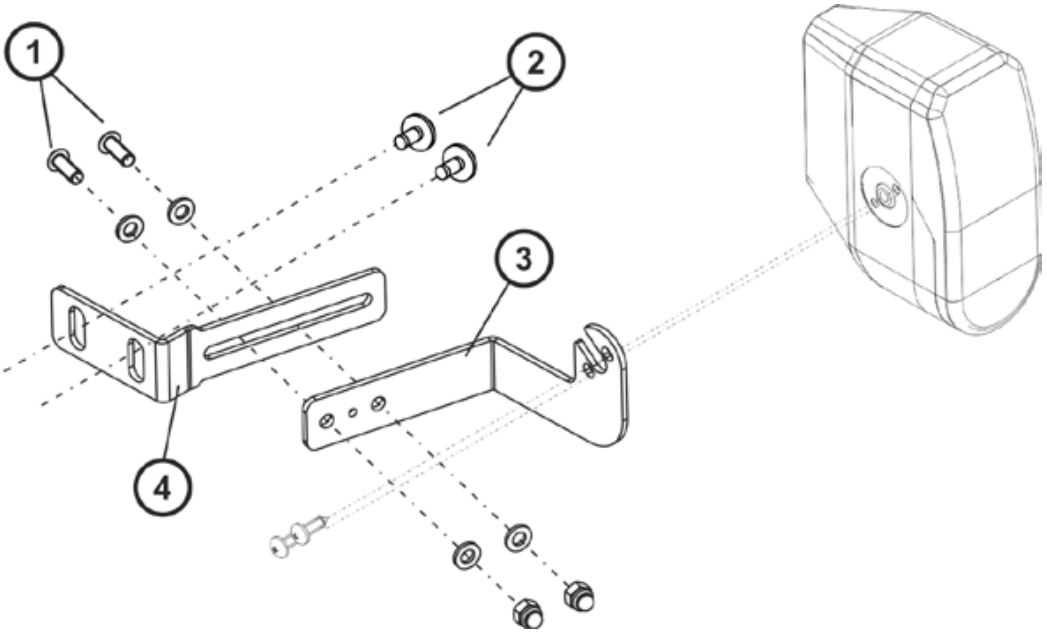


Dismantling the bulbholder:
- Remove the complete front headlight as described in chapter 8.8.2.
- Undo the two retaining screws (2) with a 13 mm socket spanner and remove the screws complete with washers.
- Remove the bulbholder (1).

Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.5 Replacing the front bulbholder - TDX SP2 / TDX SP^{NB} (conventional lighting system)

Requirements:
- Phillips screwdriver
- 4 mm Allen key
- 6 mm Allen key
- socket spanner, 13 mm
- socket spanner, 10 mm



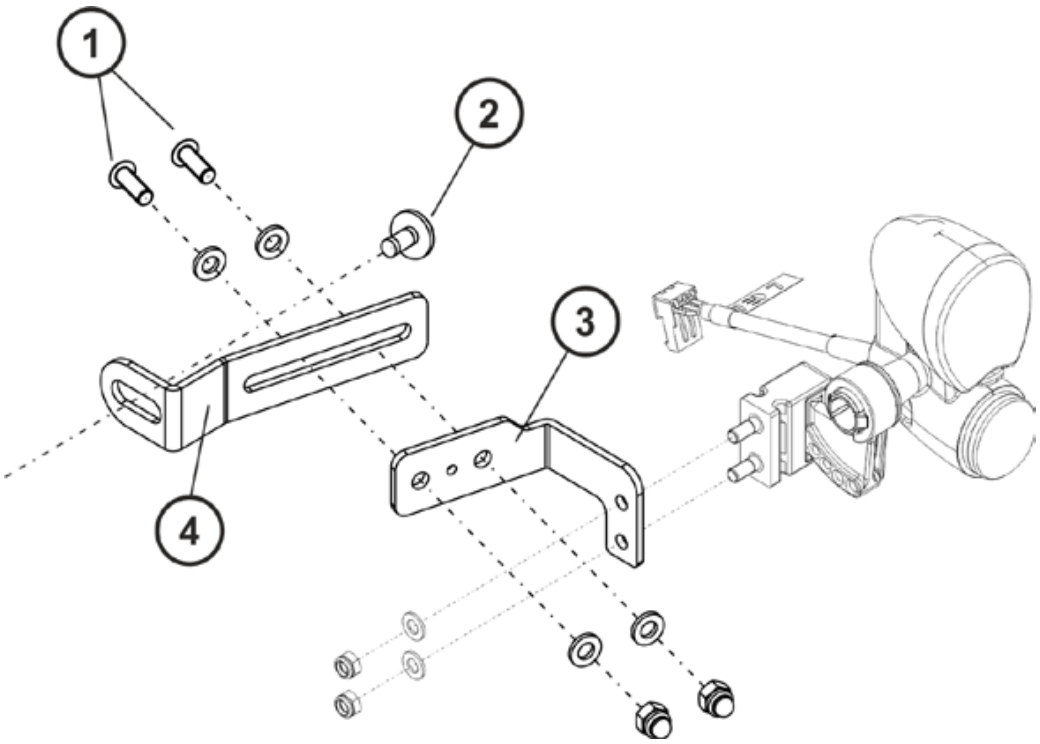
Dismantling the bulbholder:
- Remove the complete front headlight as described in chapter 8.8.2.
- Loosen the two retaining screws (2) with a 13 mm socket spanner and remove the screws complete with washers.
- Remove the bulbholder (4).

Moving the bulbholder (3):
- Loosen the two screws (1) with a 4 mm Allem key und a 10 mm socket spanner.
- Move the bulbholder (3) into the desired position.
- Refit the two screws (1) including the washers and nuts.

Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.6 Replacing the front bulbholder - TDX SP2 (LED lighting system)

Requirements:
- Phillips screwdriver
- 4 mm Allen key
- 6 mm Allen key
- socket spanner, 13 mm
- socket spanner, 10 mm



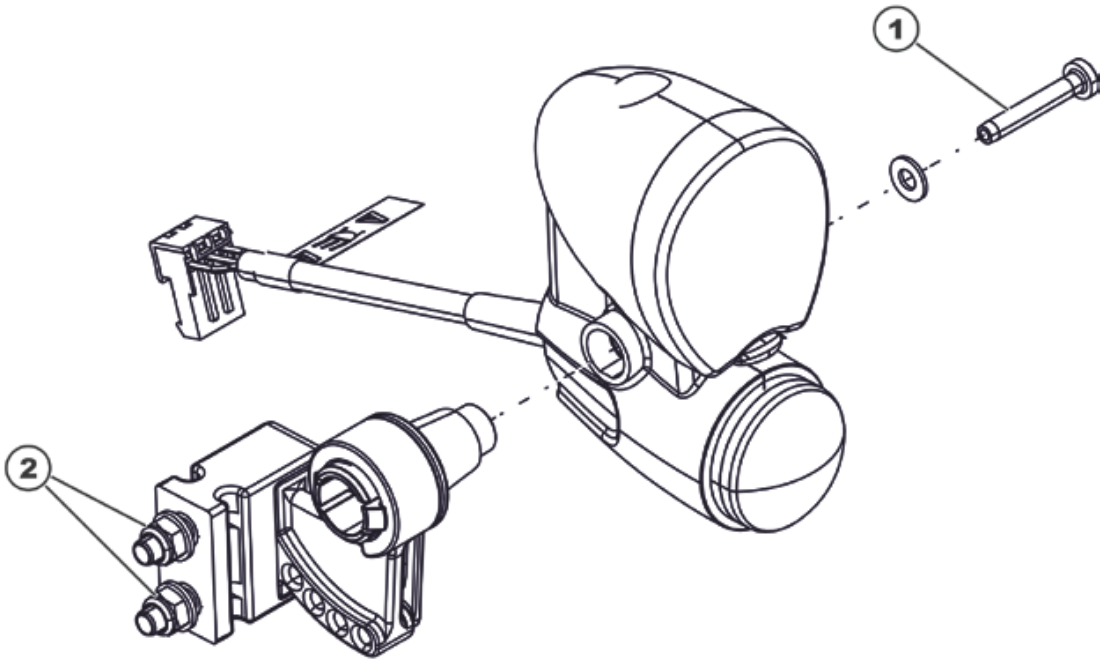
Dismantling the bulbholder:
- Remove the complete front headlight as described in chapter 8.8.3.
- Loosen the two retaining screws (2) with a 13 mm socket spanner and remove the screws complete with washers.
- Remove the bulbholder (4).

Moving the bulbholder (3):
- Loosen the two screws (1) with a 4 mm Allem key und a 10 mm socket spanner.
- Move the bulbholder (3) into the desired position.
- Refit the two screws (1) including the washers and nuts.

Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.7 Replacing the front bulbholder (LED lighting system)

Requirements:
- 4 mm Allen key
- socket spanner, 8 mm



Dismantling the bulbholder:

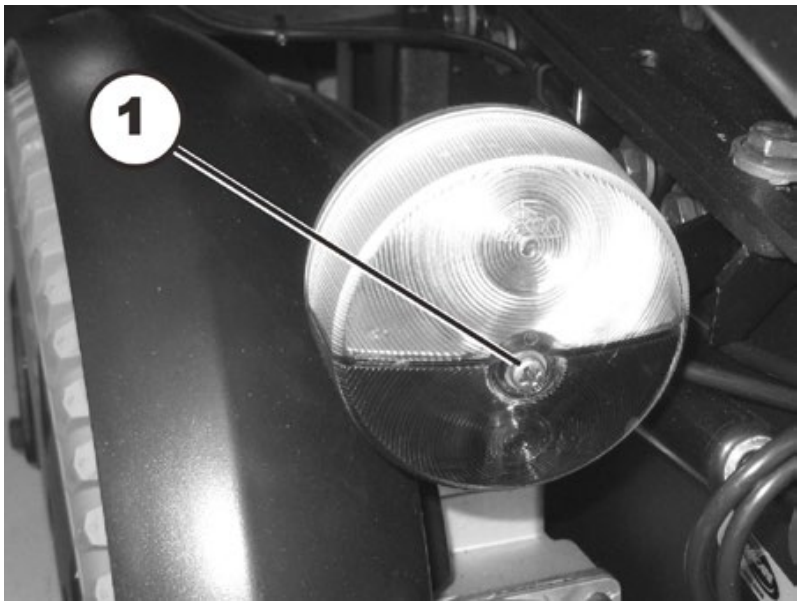
- Loosen the Allen screw (1) with a 4 mm Allem key and remove the front bulb from the holder.
- Loosen the two nuts (2) using an 8 mm spanner and remove the headlight with the mounting from the rubber bumpers.
- Remove the bulbholder (4).

Refitting the bulbholder:

- Refit the parts in reverse order.
- Now tighten all the screws finger-tight again.
- Adjust the headlight roughly using the grid.
- Check all vehicle functions.
- Adjust the headlight roughly using the grid. The user can carry out the final adjustment following the operating manual.

8.8.8 Replacing the rear bulb (conventional lighting system)

Requirements:
- Phillips screwdriver size 2



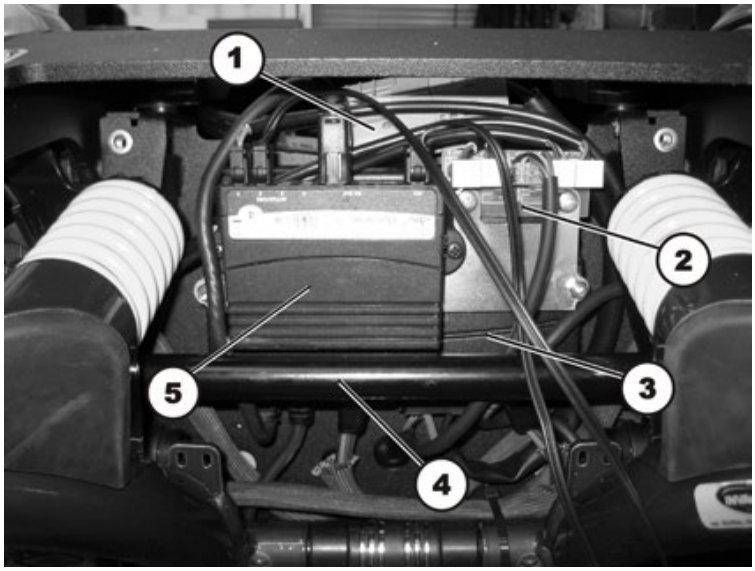
- Undo the Philips screw in the transparent cover over the rear light/indicator combination.
- Remove the transparent plastic cover.
- Replace the defective bulb.
- Close the cover and tighten the Philips screw finger-tight.

8.8.9 Replacing the rear light complete (conventional lighting system up to 08/2014)

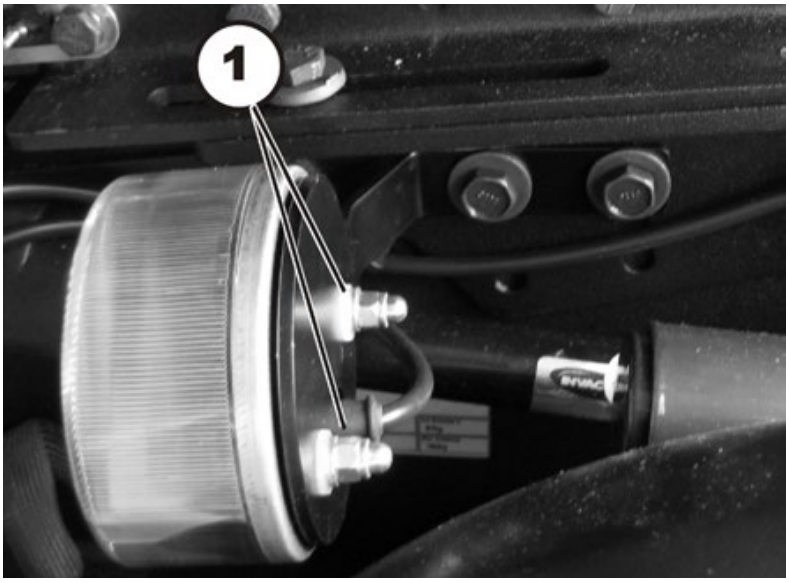
Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm

Removing the rear light

- Remove the rear panel as described in chapter 8.1.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the rear light affected.
- Remove all cable ties and pull the cable out of the wheelchair.



- Undo the two cap nuts (1) with an 8 mm socket spanner and remove the cap nuts complete with washers.
- Replace the rear light.

Dismantling the rear light:

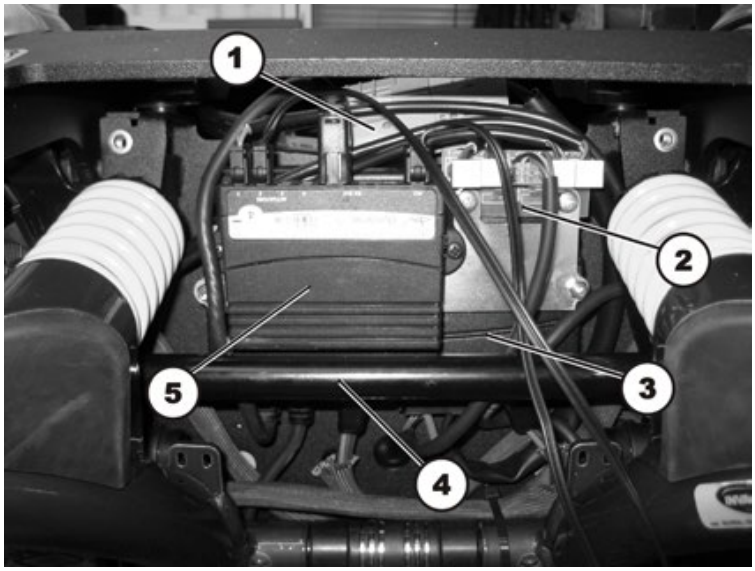
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.10 Replacing the rear light complete (conventional lighting system starting 08/2014)

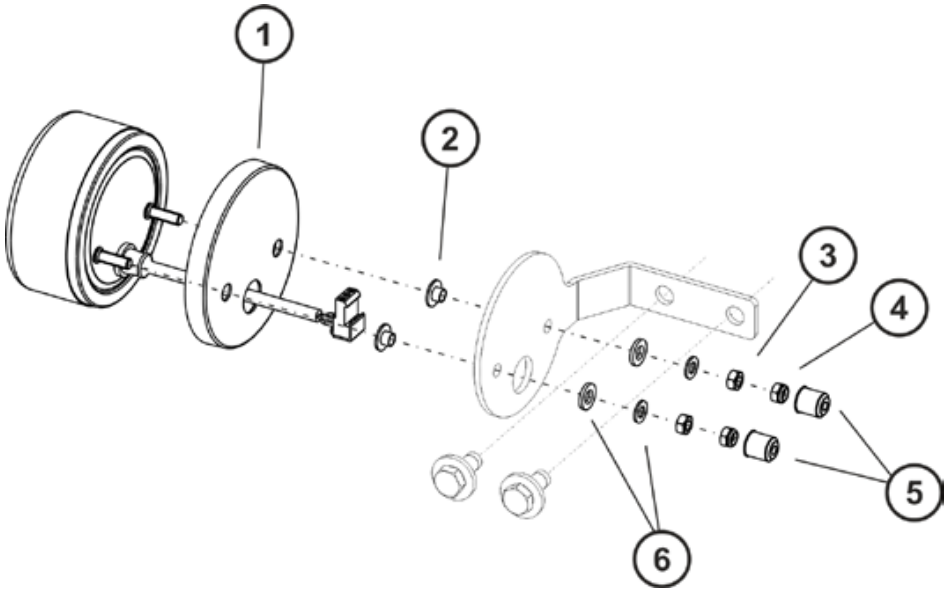
Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm

Removing the rear light

- Remove the rear panel as described in chapter 8.1.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the rear light affected.
- Remove all cable ties and pull the cable out of the wheelchair.



- Remove the two protect caps (5).
- Loosen and remove the two nuts (4) and (3) including the washers (6) and insulation ring (2) with an 8 mm socket spanner.
- Replace the rear light and the lamp protector if necessary.

Dismantling the rear light

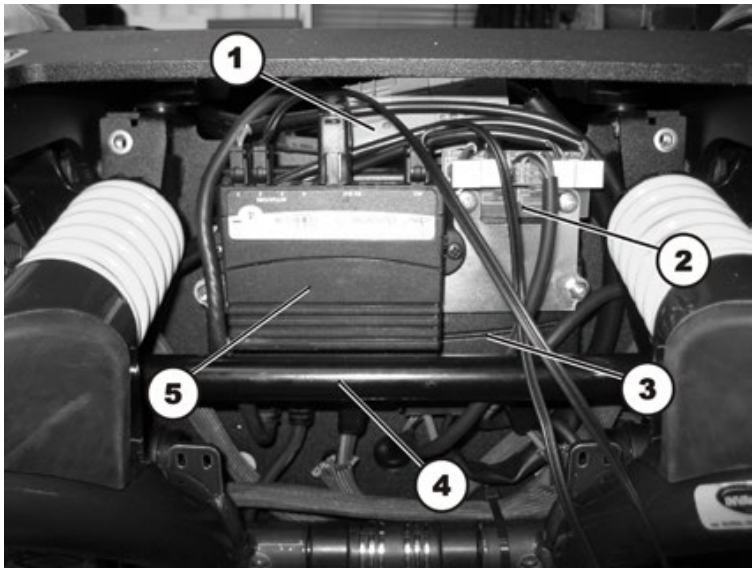
- Refit the parts in reverse order.
- Tighten the nuts (3) and (4) to 2,5 +/-0,3 Nm.
- Check all vehicle functions.

8.8.11 Replacing the rear light complete - TDX SP2 (conventional lighting system)

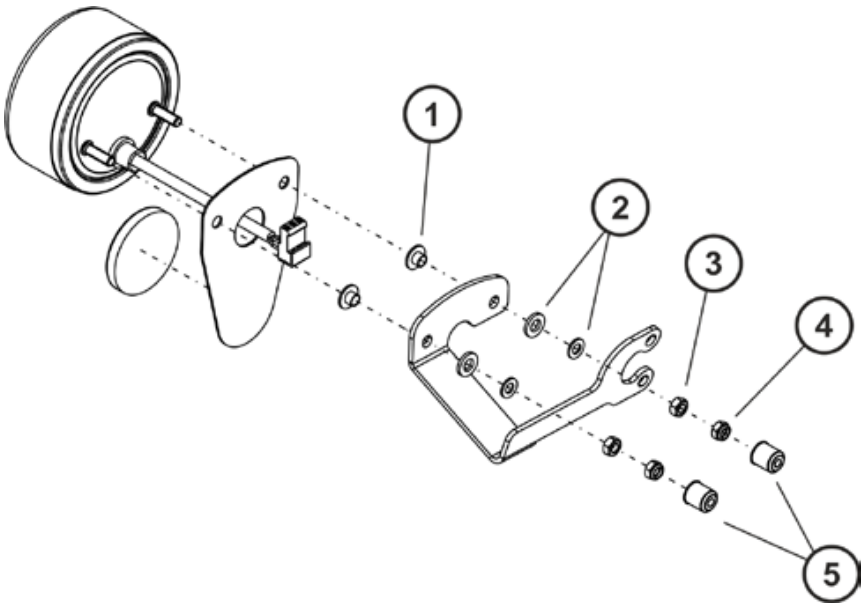
Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm

Removing the rear light

- Remove the rear panel as described in chapter 8.1.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the rear light affected.
- Remove all cable ties and pull the cable out of the wheelchair.



- Remove the two protect caps (5).
- Loosen and remove the two nuts (4) and (3) including the washers (2) and the protection caps (1) with an 8 mm socket spanner.
- Replace the rear light.

Dismantling the rear light

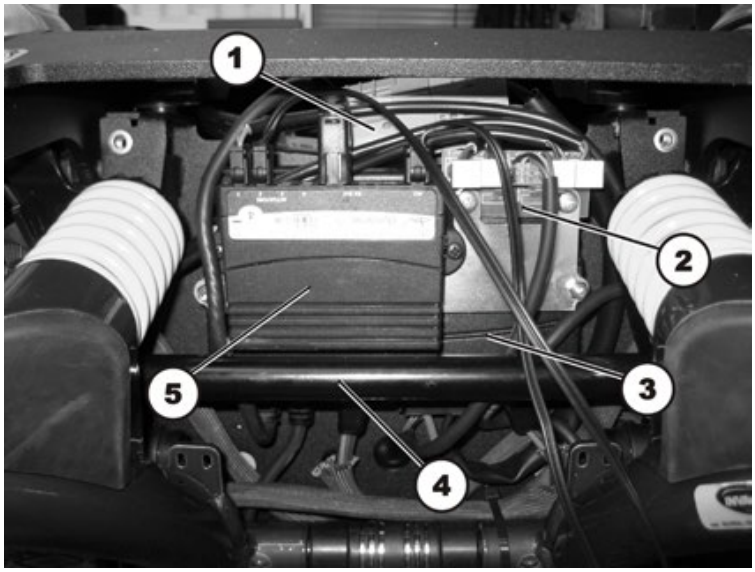
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.12 Replacing the rear light complete - TDX SP2 (LED lighting system)

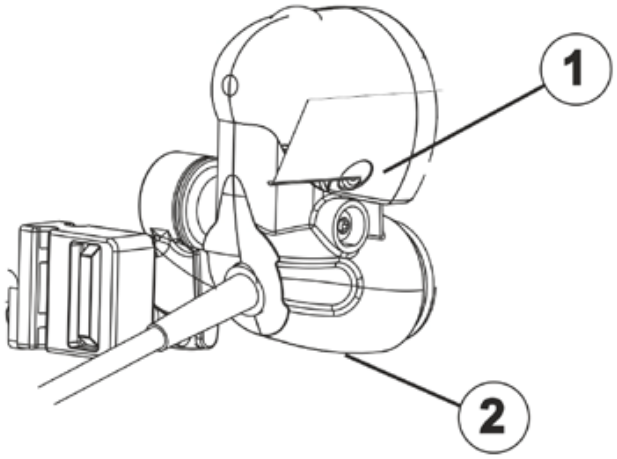
Requirements:
- 4 mm Allen key
- socket spanner, 13 mm

Removing the rear light

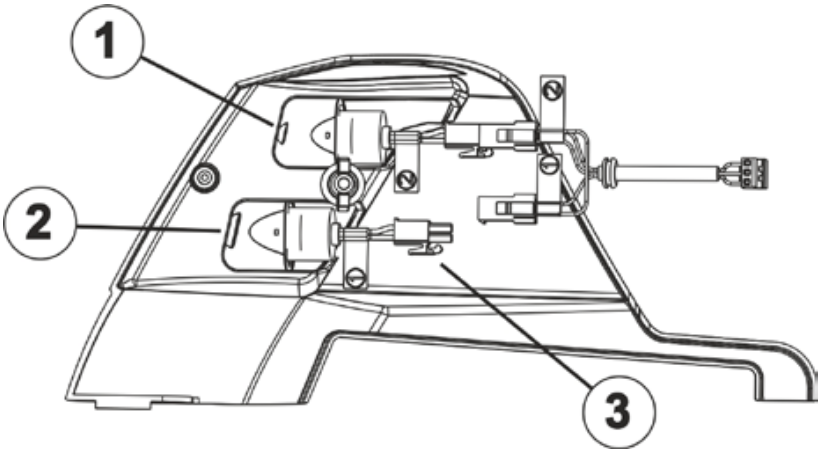
- Remove the rear panel as described in chapter 8.2.2.



- Carefully note the location of the cable and the connection locations of the various plugs. Either mark each plug and socket, or take a photograph with a digital camera.
- On the illustration you can see the battery plug (1), the lighting PCB (2) for the electronic module (3), the optional cross connector (4) and the optional actuator module (5).
- Loosen the cable leading to the lighting PCB from the rear light affected.
- Remove all cable ties and pull the cable out of the wheelchair.



- Loosen the butterfly nut (2). The plastic housing is held by a butterfly nut which is undone from below.
- Remove the plastic cover (1).



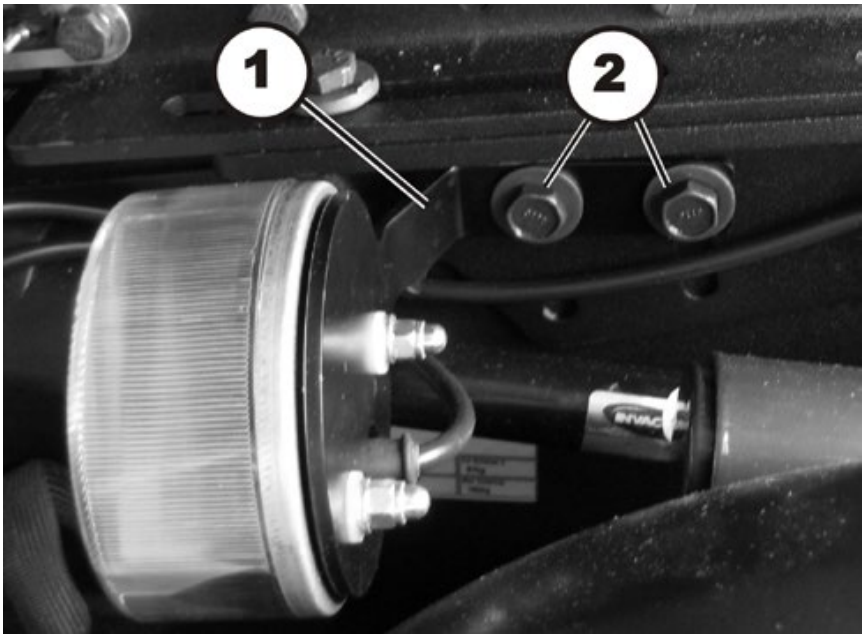
- Open the connector plug (3) for the rear light which needs to be replaced.
- The rear lights are only clamped in by the plastic housing. If required, replace the red rear light (2) or the indicator (1). The cables are labelled appropriately.

Dismantling the rear light

- Refit the parts in reverse order.
- Tighten all the screws finger-tight again.
- Check all vehicle functions.

8.8.13 Replacing the rear bulbholder (conventional lighting system until 08/2014)

Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm
- socket spanner, 13 mm

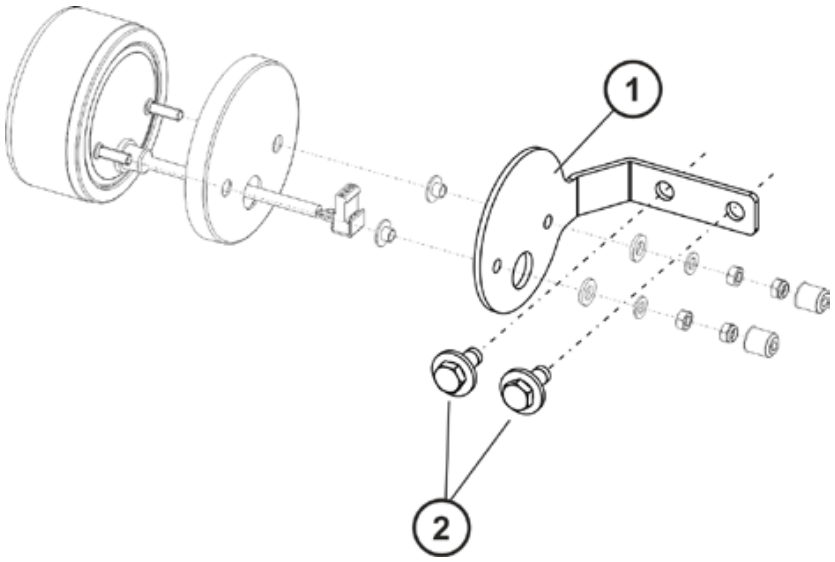


Dismantling the bulbholder:
- Remove the complete rear light as described in chapter 8.8.8.
- Undo the two retaining screws (2) with a 13 mm socket spanner and remove the screws complete with washers.
- Replace the bulbholder (1).

Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.14 Replacing the rear bulbholder (conventional lighting system until 08/2014)

Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm
- socket spanner, 13 mm

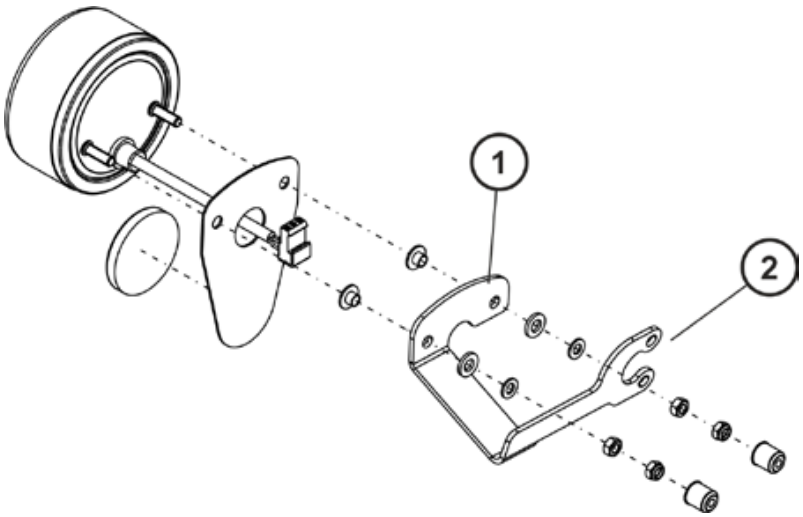


Dismantling the bulbholder:
- Remove the complete rear light as described in chapter 8.8.10.
- Undo the two retaining screws (2) with a 13 mm socket spanner and remove the screws complete with washers.
- Replace the bulbholder (1).

Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.8.15 Replacing the rear bulbholder - TDX SP2 (conventional lighting system)

Requirements:
- Phillips screwdriver size 2
- socket spanner, 8 mm
- 3/16" Allen key



Dismantling the bulbholder:
- Remove the complete rear light as described in chapter 8.8.11.
- Undo the two retaining screws (2) on the chassis with a 3/16" Allen key and remove the screws including the washers.
- Replace the bulbholder (1).

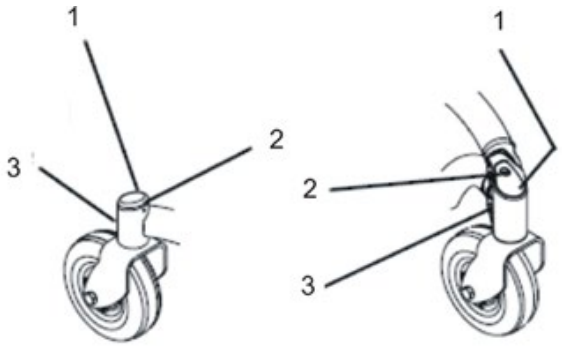
Refitting the bulbholder:
- Refit the parts in reverse order.
- Check all vehicle functions.

8.9 Wheel forks front/rear

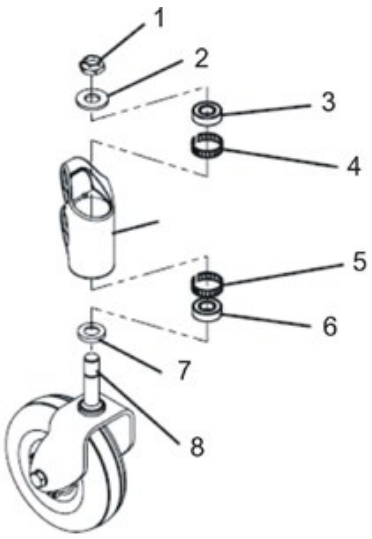
8.9.1 Replacing the wheel fork

Requirements:
- Phillips screwdriver size 2
- 5/8“ socket spanner

Removing the wheel forks:

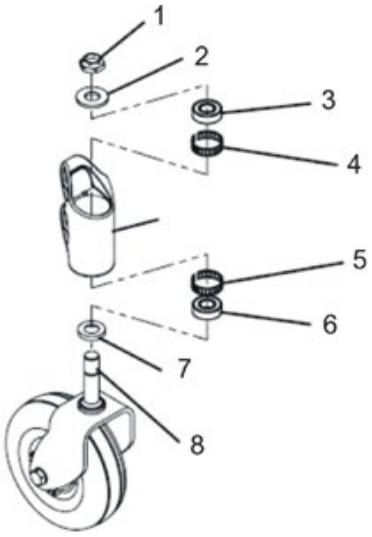


- Undo the Philips screw (2).
- Take the cover cap (2) off the castor housing (3).

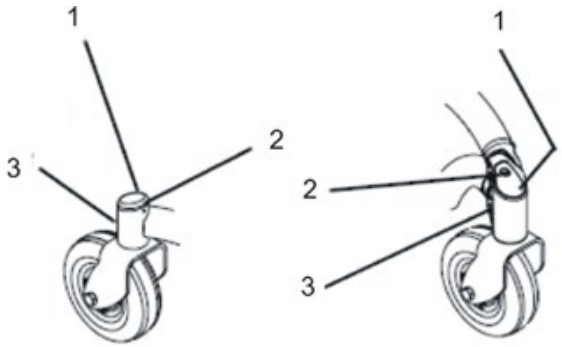


- Loosen the nut (1) with a 5/8" socket spanner.
- Remove the washer (2).
- Pull the wheel fork (8) and the spacer (7) away downwards.
- If necessary, you should also remove the ball-bearings (3) and (6) in addition to the tolerance rings (4) and (5).

Refitting the wheel fork:



- If you removed them, replace the tolerance rings (4) and (5) and the ball-bearings (3) and (6).
- Place the spacer (7) on the wheel fork (8).
- Insert the wheel fork from underneath.
- Fit the washer (2) from above.
- Fit the nut (1) and tighten it with a 5/8" socket spanner loosely so that the wheel forks can just turn.
- Adjust the castor as described in chapter 8.9.2.



- Place the cover cap (1) on the castor housing (3).
- Tighten the Philips screw (2) finger-tight.

8.9.2 Adjusting the wheel fork

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

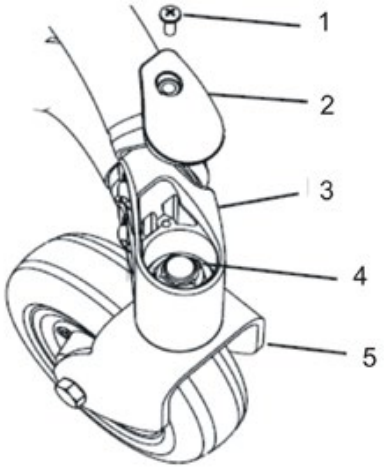
- *Use proper lifting techniques.*

Requirements:

- Phillips screwdriver size 2
- 5/8“ socket spanner

Note

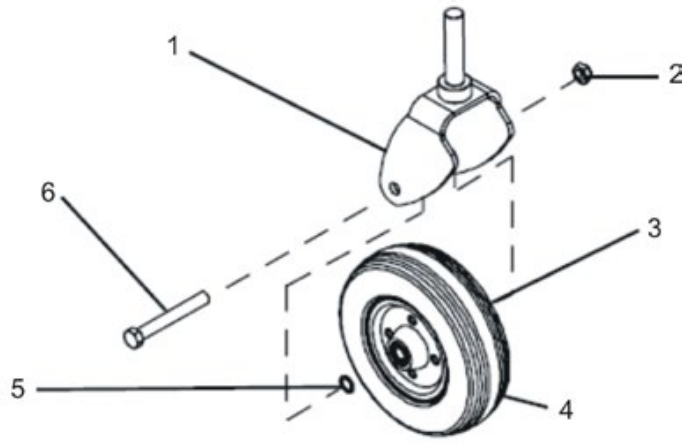
The front and rear wheels are adjusted in the same manner. The following illustrations only show the front castor.



- If necessary, remove the Philips screw (1) and the cover cap (2).
- Tilt the wheelchair to the rear. Use proper lifting techniques.
- Rotate the wheel forks (5) upwards.
- Let go of the wheel forks so that they can swing downwards again.
- Adjust the nut (4) with a 5/8“ socket spanner so that the wheel forks are not too loose but can still rotate freely.
  The wheel forks should oscillate to the opposite side a maximum of once and then come to rest facing downwards.
- Place the wheelchair on all four wheels again.
- Test the wheelchair's manoeuvrability.
- Repeat the adjustment steps if necessary until the castors are correctly adjusted.
- Replace the cap (2) and tighten the Philips screw (1) finger-tight.

8.9.3 Replacing the wheels on double-sided wheel forks

Requirements:
- 7/16“ socket spanner
- 7/16“ jaw spanner
- torque wrench 5 - 25 Nm (or similar)



Removing the wheel:
- Loosen the nut (2) with a 7/16" socket spanner.
- Remove the bolt (6) with a 7/16" socket spanner.
- Remove the two washers (3) and (5).
- Remove the wheel (4).
- Replace any defective parts.

Refitting the wheel:
- Refit the parts in reverse order.
- Tighten the bolt (6) and the nut (2) to 18 Nm.

8.10 Drive wheels

8.10.1 Replacing the drive wheel

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

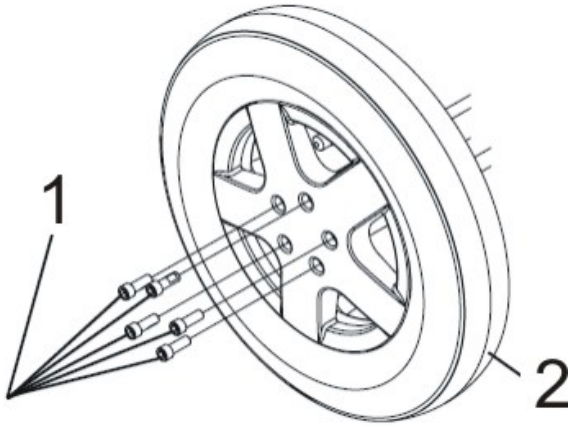
- *Use proper lifting techniques.*

Injury hazard caused by uncontrolled movement of the mobility device!

- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

Requirements:

- 7/8“ Allen key
- two long wooden blocks, min. 14 x 14 x 30 cm
- torque wrench 5 - 25 Nm (or similar)



Removing the drive wheel:

- Lift the wheelchair up on one side and place a 14 cm high wooden block underneath it so that the drive wheel is off the ground and can rotate freely. Use proper lifting techniques.
- If necessary, repeat this procedure for the other side of the wheelchair.
- Remove the five 7/8" Allen screws (1).
- Take the wheel (2) off the wheel hub.

Refitting the drive wheel:

- Refit the wheel in reverse order.
- Tighten the bolts to 18 Nm.

8.10.2 Replacing the tyre or inner tube

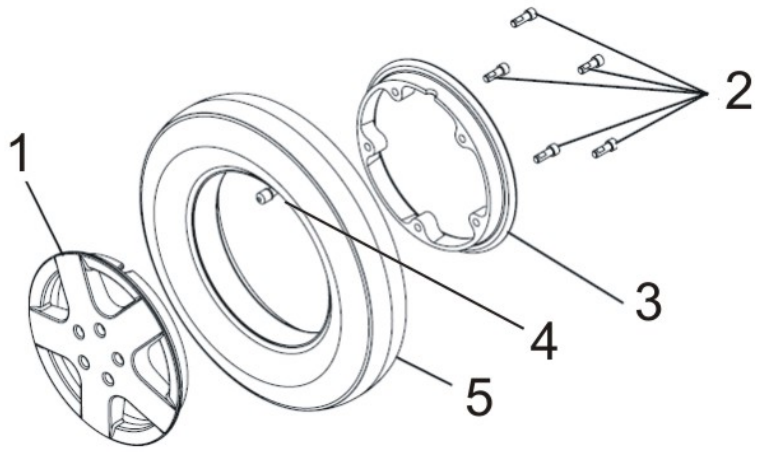
Note
There are three different types of tyres or inner tubes, and specific points must be observed for the replacement of each type.
It is easy to tell the difference between the tyre or inner tube types:
- Pneumatic tyres have black valve caps.
- Puncture-protected tyres have red valve caps
- puncture-proof tyres have no valves.

Please proceed in accordance with the appropriate chapter:
- Replacing pneumatic tyres – see chapter 8.10.2.1
- Replacing puncture-protected tyres – see chapter 8.10.2.2
- Replacing puncture-proof tyres – see chapter 8.10.2.3

8.10.2.1 Replacing pneumatic tyres

Note
Pneumatic tyres have black valve caps. Puncture-protected tyres have red valve caps

Requirements:
- 7/8“ Allen key
- two long wooden blocks, min. 14 x 14 x 30 cm
- torque wrench 5 - 25 Nm (or similar)
- Repair kit for tyre repair **or** a new inner tube
- Tyre pump or compressor
- Talcum powder



Removing the tyres:

- Remove the wheel as described in chapter 8.10.1.

ATTENTION: Explosion hazard!

There is considerable pressure in the tyre. Danger of injury! Parts can be thrown out and injure you if you do not evacuate all the air from the tyre.

- *Press the release pin in the valve inwards and evacuate all the air from the tyre.*

- Remove the valve cover (4).
- Press the release pin in the valve inwards and evacuate all the air from the tyre.
- Loosen the five 7/8" Allen screws (2) on the inside of the wheel.
- Remove the inside (3) and outside ring (1) on the wheel rim from the tyres (5).
- Replace any defective or worn parts.

Refitting the tyres:

- Refit the tyres onto the wheel rim in reverse order.

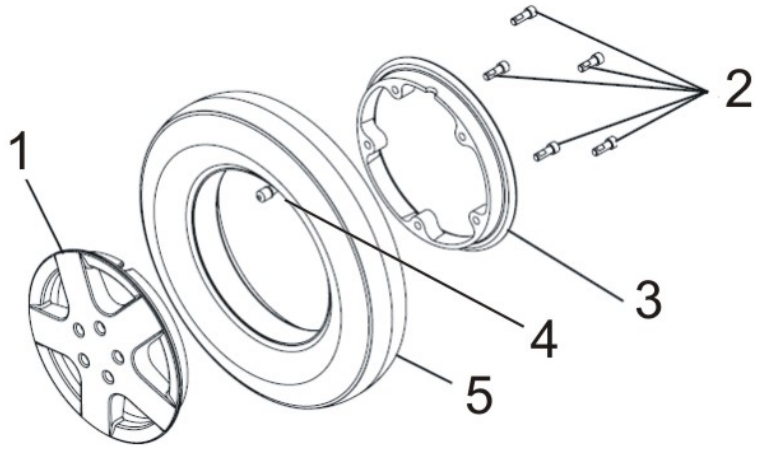
Note
If the old inner tube is to be repaired and re-used, and has become wet during repair, you can make replacement easier by sprinkling the inner tube with a little talcum powder.

- When putting the rim rings back together, ensure that drillholes and threads for the bolts are exactly over each other.
- Tighten the Allen screws (2) to 18 Nm.
- Inflate the inner tube to the specified air pressure.

8.10.2.2 Replacing puncture-protected tyres

Note
Pneumatic tyres have black valve caps. Puncture-protected tyres have red valve caps

Requirements:
- 7/8" Allen key
- Two long wooden blocks, min. 14 x 14 x 30 cm
- Torque spanner 5 - 25 Nm (or similar)
- Repair kit for tyre repair **or** a new inner tube
- Tyre pump or compressor
- Talcum powder



Removing the tyres:
- Remove the wheel as described in chapter 8.10.1.

ATTENTION: Explosion hazard!
There is considerable pressure in the tyre. Danger of injury! Parts can be thrown out and injure you if you do not evacuate all the air from the tyre.
- *Press the release pin in the valve inwards and evacuate all the air from the tyre.*

CAUTION!
Material damage hazard. The valve can become blocked by the puncture protection gel and be unusable!
- *During the following work you should always hold the valve up so that the puncture protection gel cannot enter the valve.*

- Remove the valve cover (4).
- Press the release pin in the valve inwards and evacuate all the air from the tyre.
- Undo the five 7/8“ Allen screws (2) on the inside of the wheel.
- Remove the inner (3) and outer (1) ring of the rim from the tyre (5).
- Replace any defective or worn parts.

Refitting the tyres:

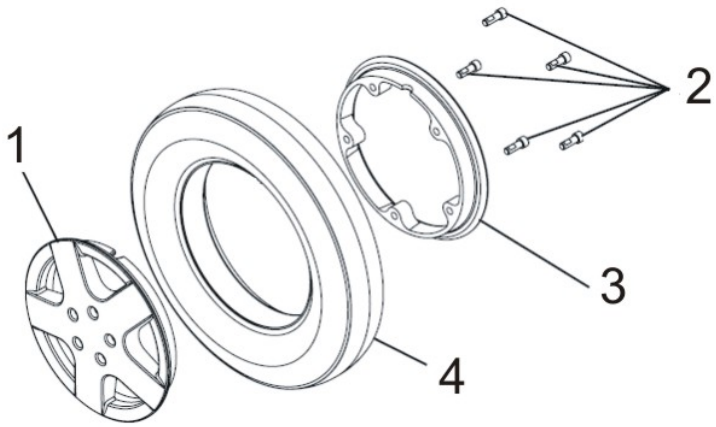
- Refit the tyres to the rim in the reverse sequence.

Note
If the old inner tube is to be repaired and re-used, and has become wet during repair, you can make replacement easier by sprinkling the inner tube with a little talcum powder.

- When fitting the rim rings together, ensure that the drillholes and threads for the bolts are placed exactly above each other.
- Tighten the Allen screws (2) to 18 Nm.
- Inflate the inner tube to the specified air pressure.

8.10.2.3 Replacing puncture-proof tyres

Requirements:
- 7/8" Allen key
- Two long wooden blocks, min. 14 x 14 x 30 cm
- Three joiner's clamps with plastic caps
- Torque spanner 5 - 25 Nm (or similar)
- Talcum powder



Removing the tyres:
- Remove the wheel as described in chapter 8.10.1.

ATTENTION: Explosion hazard!

There is considerable pressure in the tyre. Danger of injury! Parts can be thrown out and injure you if you do not secure the rim rings.
- *Secure the rim rings with joiner's clamps.*

- Secure the rim rings against unexpected discharge with three joiner's clamps. When doing so, ensure that you do not scratch the rims.
- Undo the five 7/8“ Allen screws (2) on the inside of the wheel.
- Now loosen the joiner's clamps carefully and alternately until you can remove the rim rings without danger.
- Remove the inner (3) and outer (1) ring of the rim from the tyre (4).
- Replace any defective or worn parts.

Refitting the tyres:
- Refit the tyres to the rim in the reverse sequence.
- When fitting the rim rings together, ensure that the drillholes and threads for the bolts are placed exactly above each other.
- Place the joiner's clamps in position.
- Tighten the joiner's clamps alternately in small stages until the rim rings are precisely aligned.
- Tighten the Allen screws (2) to 18 Nm.

8.10.3 Replacing the drive wheel hub (Standard motor)

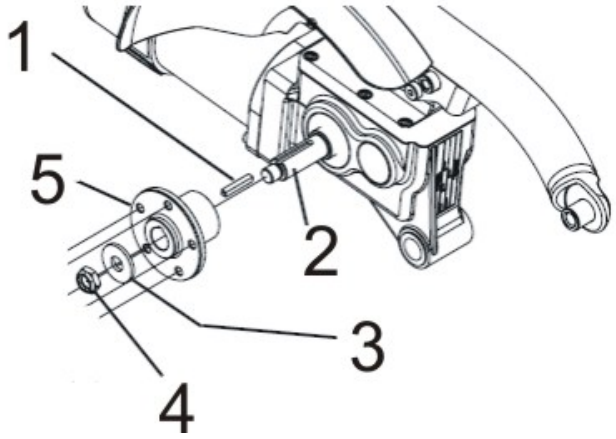
CAUTION!

Possible material damage to mobility device! Collisions can be caused if the adjusting washers are removed during fitting work to the drive wheels!

- *Adjusting washers are often fitted between the drive shaft and the wheel hub to even out tolerances. If these adjusting washers are removed and not replaced again, collisions can be caused.*
- *Always replace the adjusting washers exactly as they were before you started dismantling.*

Requirements:

- socket spanner, 20 mm



Removing the drive wheel hub:

- Loosen and remove the nuts (4) with a 20 mm socket spanner.
- Remove the washer (3).
- Take the wheel hub (5) off the axle (2).
- Take the feather key (1) off the axle.

Refitting the drive wheel hub:

- Refit the drive wheel hub parts in reverse order.
- Use a thin film of lubricant to make pushing the wheel hub onto the axle easier.
- Tighten the nuts (4) to 60 Nm.

8.10.4 Replacing the drive wheel hub (SSD motor)

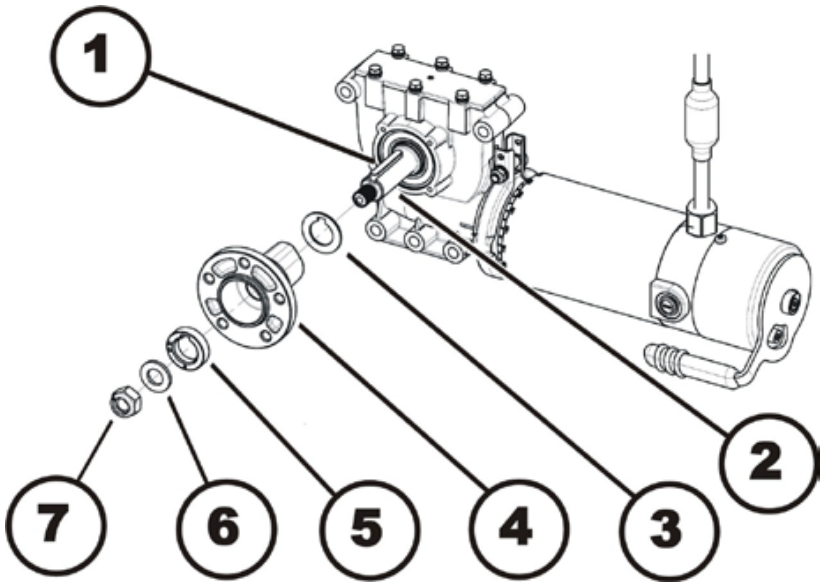
CAUTION!

Possible material damage to mobility device! Collisions can be caused if the adjusting washers are removed during fitting work to the drive wheels!

- *Adjusting washers are often fitted between the drive shaft and the wheel hub to even out tolerances. If these adjusting washers are removed and not replaced again, collisions can be caused.*
- *Always replace the adjusting washers exactly as they were before you started dismantling.*

Requirements:

- socket spanner, 19 mm



Removing the drive wheel hub:

- Loosen and remove the nuts (7) with a 19 mm socket spanner.
- Remove the washer (6).
- Remove the distance ring (5).
- Take the wheel hub (4) off the axle (2).
- Remove the shim ring (3).
- Take the feather key (1) off the axle.

Refitting the drive wheel hub:

- Refit the drive wheel hub parts in reverse order.
- Use a thin film of lubricant to make pushing the wheel hub onto the axle easier.
- Tighten the nuts (4) to 60 Nm.

8.11 Rear wheel suspension

8.11.1 Removing the rear wheel suspension

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

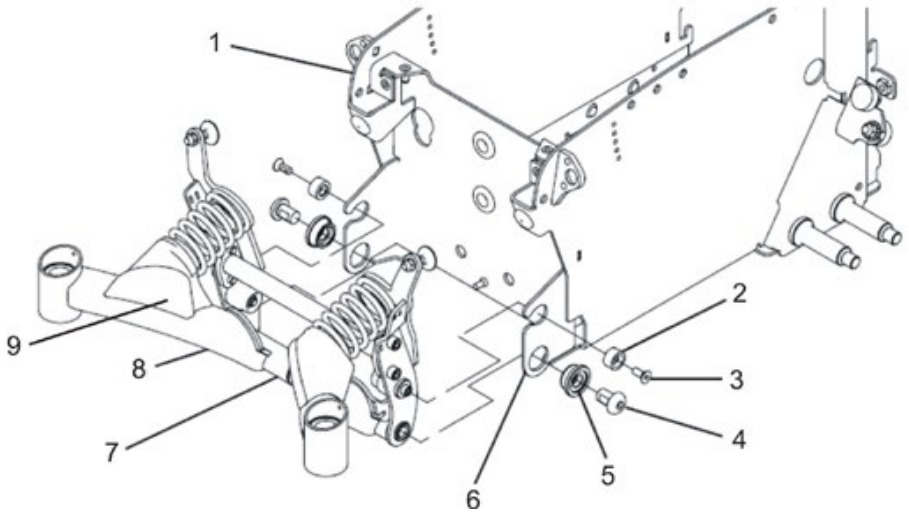
Injury hazard caused by uncontrolled movement of the mobility device!

- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

Requirements:

- 5/16“ Allen key
- 5/32“ Allen key
- Phillips screwdriver size 2
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 20 - 80 Nm (or similar)
- oblique pliers
- cable ties
- two long wooden blocks, min. 14 x 14 x 30 cm

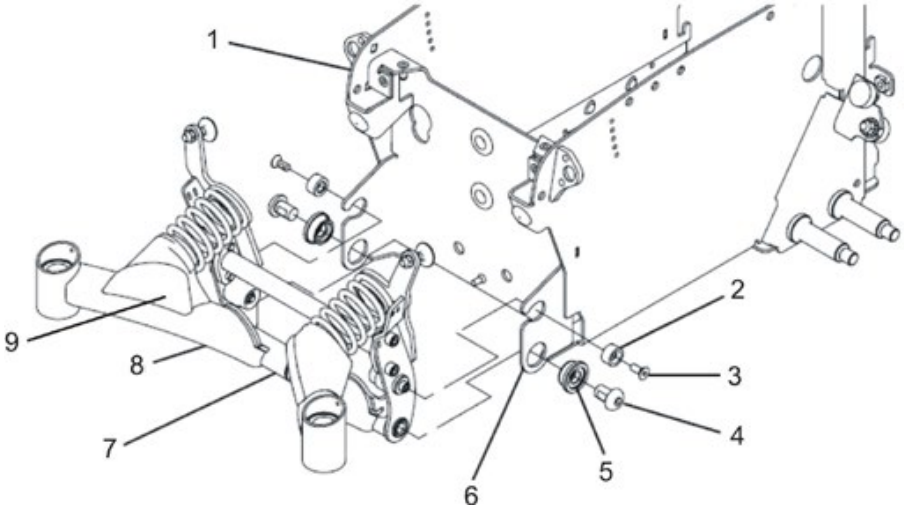
- Lift the wheelchair up on one side and place a 14 cm high wooden block under the battery case so that the wheels are off the ground and can rotate freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Remove the rear panel as described in chapter 8.1.2.
- Ensure you note the cable routing carefully. If necessary, take photos with a digital camera.
- Remove all cables and cable ties which are fixed to the wheel suspension or which could get in the way during work.



- Undo the two bolts (3) with a 5/32" Allen key and remove the bolts including the nylon washer (2).
- Undo and remove the two bolts (4) with a 5/16" Allen key and remove the bolts including the bushes (5).
  If only one of the two bolts can be removed, proceed as described in chapter 8.11.2 as an alternative.
- Take the complete rear wheel suspension off.
- Now you can replace individual parts such as the suspension arms (1) or the pivot bar (4).
- Please see chapter 8.11.3 to replace the wheel suspension at a later time.

8.11.2 Removing the rear wheel suspension – alternative method

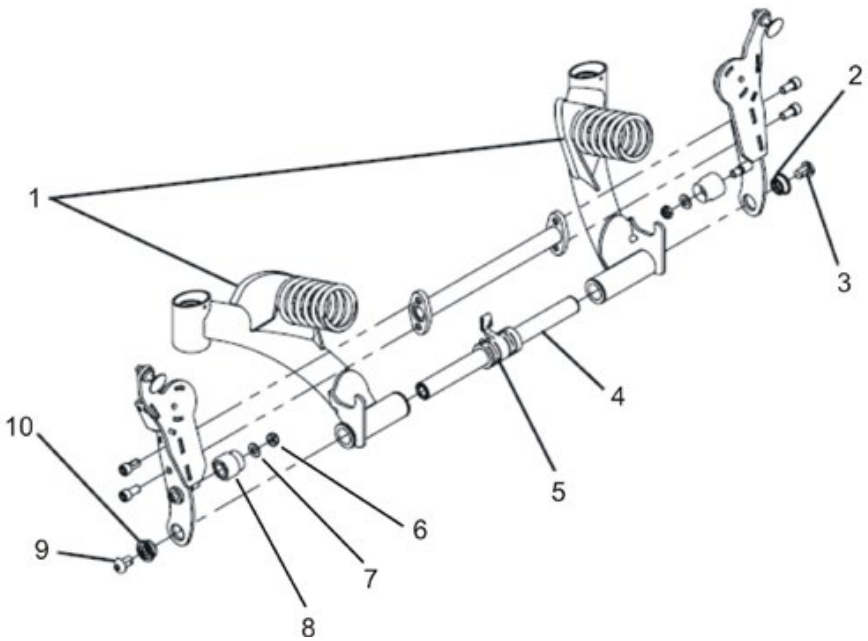
Requirements:
- more wooden blocks or
- joiner's clamps



- Carry out the following steps if only one of the two bolts (4) can be undone.
- Ensure that the rear springs are compressed:

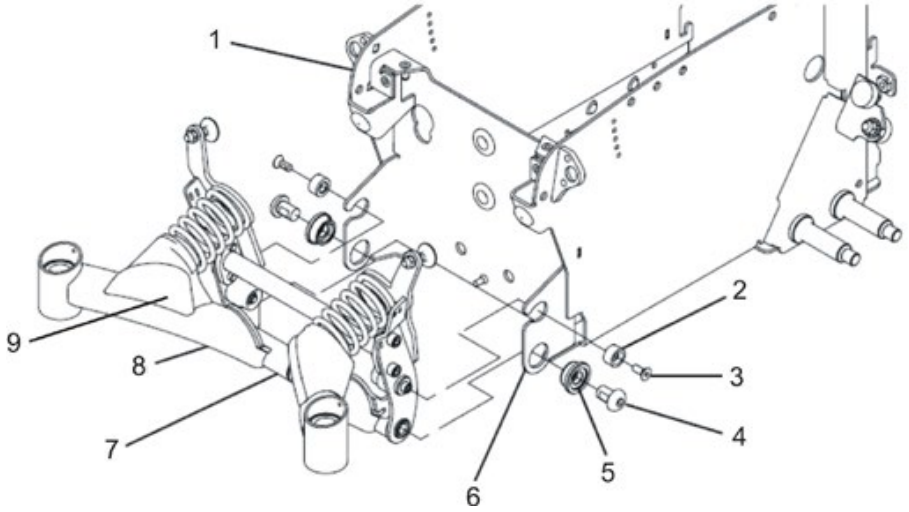
  Block method:
  - Raise the suspension arms and replace the wooden blocks underneath them until the springs are compressed.

  Clamp method:
  - Lower the suspension arms downwards as far as possible.
  - Remove the rubber caps (9).
  - Press the springs together with a joiner's clamp or similar clamp.



- Remove the pivot bar (4) by putting it sideways out of the guides together with the remaining bolt and the socket.
- Please see chapter 8.11.4 to replace the wheel suspension at a later time.

8.11.3 Refitting the rear wheel suspension

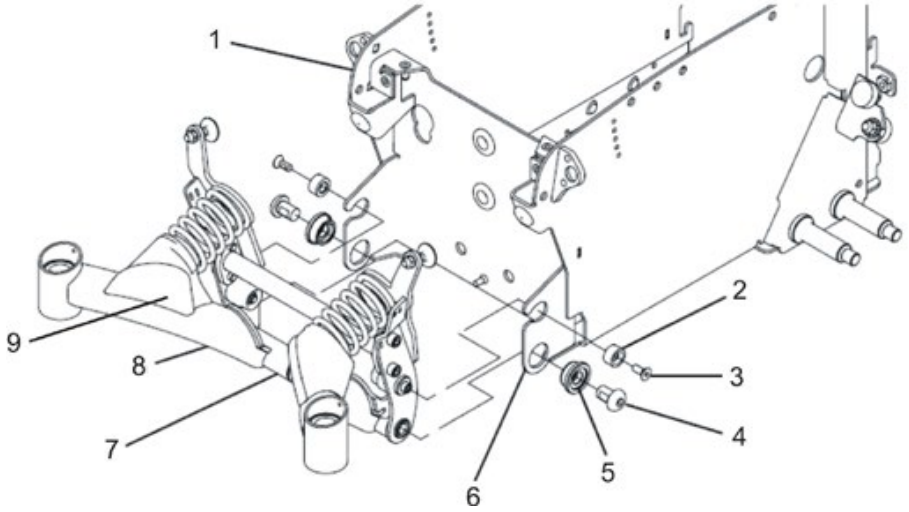


- Position the complete rear wheel suspension between the two mounting points (6).
- Fit the two sockets (5) and the two bolts (4).
- Tighten the bolts to 60 Nm.
- Ensure that the rear springs are compressed:

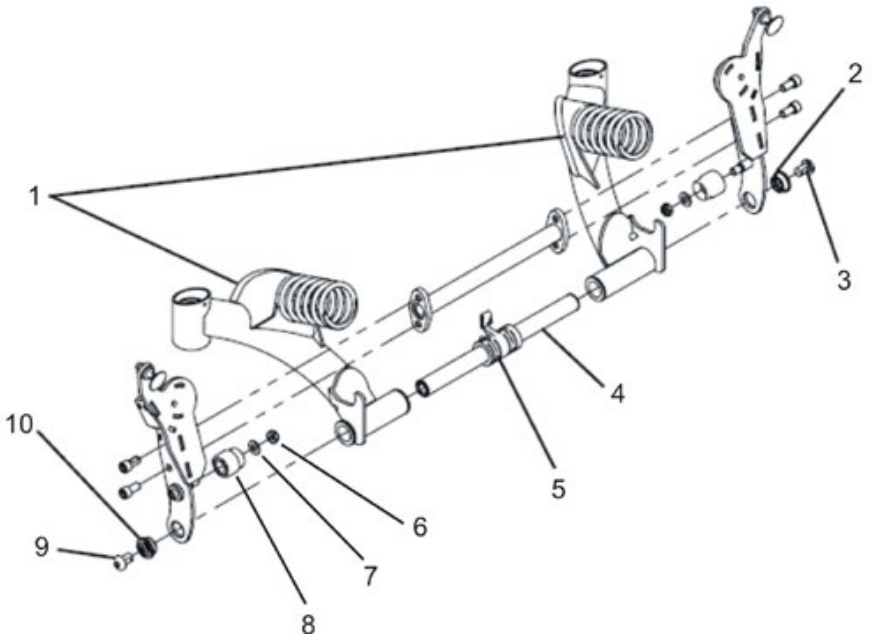
  Block method:
  - Lift the suspension arm and place wooden blocks or similar underneath it until the springs are pressed together and the nylon spacer (2) can be fitted into the recesses provided in the suspension (6).

  Clamp method:
  - Remove the rubber caps (9).
  - Press the springs together with a joiner's clamp or similar suitable clamp until the nylon spacer (2) can be fitted into the recesses provided in the suspension (6).
- Fit the two bolts (3) including the nylon spacer (2).
- Tighten the bolts to 8.5 Nm.
- Replace the two rubber caps (9) if necessary.
- Reinsert all the necessary plugs and fix the cables with cable ties as previously (see also chapter 8.5.8).
- Refit the rear panel as described in chapter 8.1.2.
- Lift the wheelchair off the wooden blocks.
- Check all the wheelchair functions.
- If necessary, carry out adjustments to the setting screw on the stability lock system as described in chapter 8.24.5.

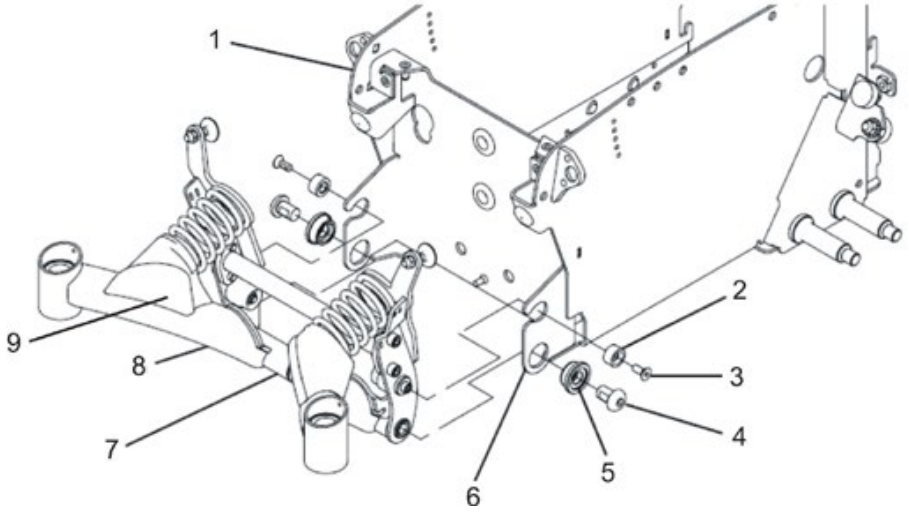
8.11.4 Refitting the rear wheel suspension – alternative method



- Position the complete rear wheel suspension between the two mounting points (6).



- Position the mounting (5) centrally between the two suspension arms (1).
- Push the pivot bar (4) including the remaining bolts and the socket from the side through the guides, the suspension arm bushes and the mounting.
- Refit the sockets and bolts you have removed.
- Tighten the bolts to 60 Nm.



- Ensure that the rear springs are compressed:

  Block method:
  - Lift the suspension arm and place wooden blocks or similar underneath it until the springs are pressed together and the nylon spacer (2) can be fitted into the recesses provided in the suspension (6).

  Clamp method:
  - Remove the rubber caps (9).
  - Press the springs together with a joiner's clamp or similar suitable clamp until the nylon spacer (2) can be fitted into the recesses provided in the suspension (6).
- Fit the two bolts (3) including the nylon spacer (2).
- Tighten the bolts to 8.5 Nm.
- Replace the two rubber caps (9) if necessary.
- Reinsert all the necessary plugs and fix the cables with cable ties as previously (see also chapter 8.5.8).
- Refit the rear panel as described in chapter 8.1.2.
- Lift the wheelchair off the wooden blocks.
- Check all the wheelchair functions.
- If necessary, carry out adjustments to the setting screw on the stability lock system as described in chapter 8.24.5.

8.12 Rear springs

8.12.1 Removing the rear springs

Note
Invacare® recommends always replacing both springs simultaneously in order to ensure that the wheelchair works perfectly.

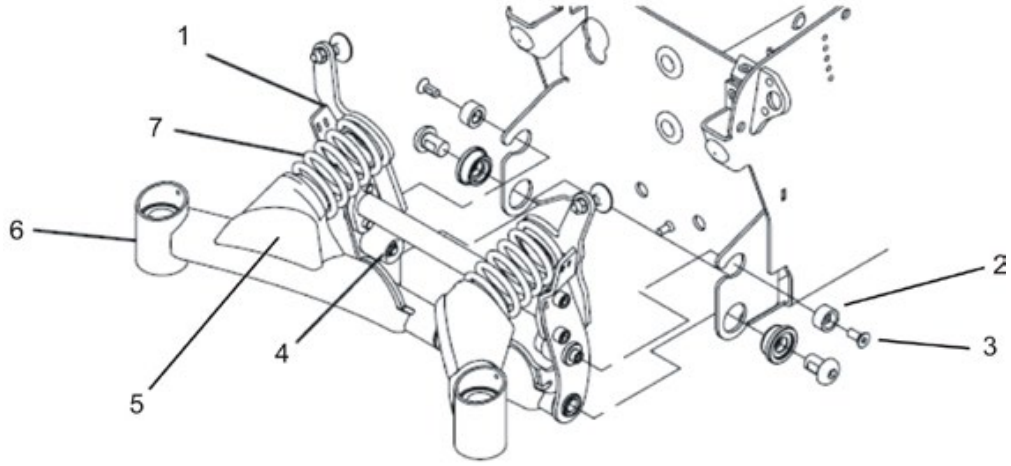
WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!
- *Use proper lifting techniques.*

Injury hazard caused by uncontrolled movement of the mobility device!
- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

Requirements:
- 5/6“ Allen key
- 5/32“ Allen key
- Phillips screwdriver size 2
- blade screwdriver
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 20 Nm (or similar)
- oblique pliers
- cable ties
- M8 washer
- two long wooden blocks, min. 14 x 14 x 30 cm

- Lift the wheelchair up on one side and place a 14 cm high wooden block under the battery case so that the wheels are off the ground and can rotate freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Remove the rear panel as described in chapter 8.1.2.
- Ensure you note the cable routing carefully. If necessary, take photos with a digital camera.
- Remove all cables and cable ties which are fixed to the wheel suspension or which could get in the way during work.
- Remove both the stability lock system protective caps.
  The protective caps on the stability lock system will either be held using a screw or a cable tie depending on the wheelchair's date of manufacture.



- Ensure that the rear springs (7) are compressed:

  Block method:
  - Raise the suspension arms (6) and place wooden blocks underneath them until the springs are pressed together enough so that the nylon stopper (4) can be removed

  Clamp method:
  - Undo both bolts (3) with a 5/32" Allen key and remove the bolts including the nylon spacer (2)
  - Make sure the suspension arms (6) are lowered as much as possible.
  - Remove the rubber caps (5).
  - Press the springs together with a joiner's clamp or similar suitable clamp until the nylon stopper (4) can be removed.
- Undo both nuts on the nylon stopper with a 5/16" socket spanner and remove the nuts, the washers and the nylon stopper. It may be necessary to use a blade screwdriver to loosen the nylon stopper.
- Remove the wooden blocks or joiner's clamps carefully so that the springs are released.
- Remove the springs.

8.12.2 Refitting the rear springs

Note
Invacare® recommends always replacing both springs simultaneously in order to ensure that the wheelchair works perfectly.

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

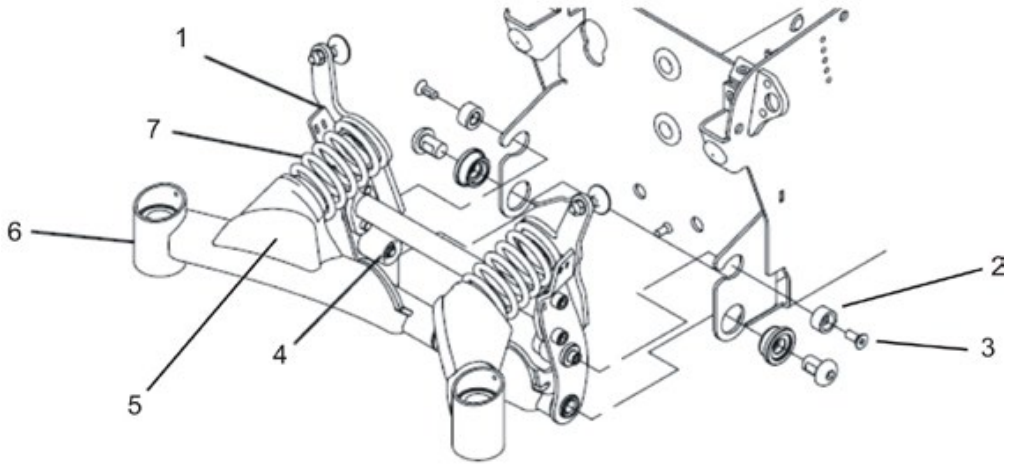
- *Use proper lifting techniques.*

Injury hazard caused by uncontrolled movement of the mobility device!

- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

Requirements:

- 5/6“ Allen key
- 5/32“ Allen key
- Phillips screwdriver size 2
- blade screwdriver
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 20 Nm (or similar)
- oblique pliers
- cable ties
- M8 washer
- two long wooden blocks, min. 14 x 14 x 30 cm



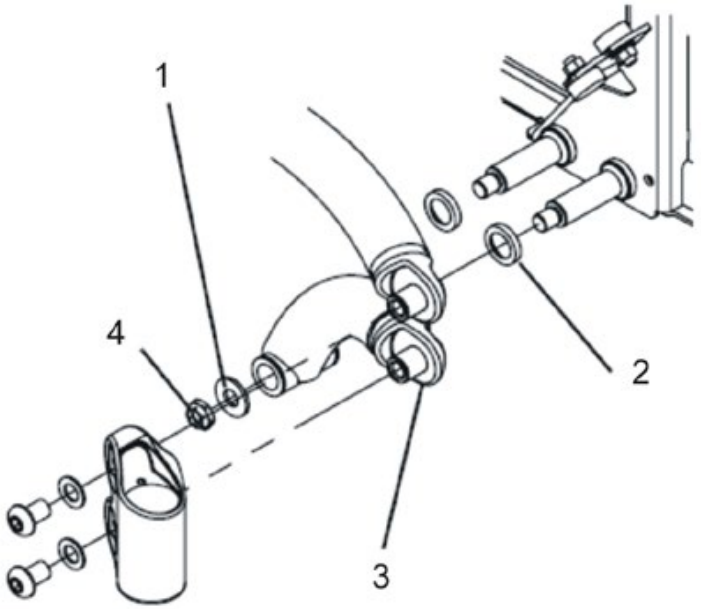
- Put the springs (7) into position between the suspension arm (6) and the stop (1).
- Ensure that the rear springs are compressed:

  Block method:
  - Raise the suspension arms and replace the wooden blocks underneath them until the springs are compressed.

  Clamp method:
  - Press the springs together with a joiner's clamp or similar suitable clamp until the nylon spacer (2) can be fitted into the recesses provided in the suspension (6).
  - Fit the two bolts (3) including the nylon spacer (2).
  - Tighten the bolts to 8.5 Nm.
- Fit the two nylon stoppers (4).
- Fit the washer and nuts to secure the nylon stoppers.
- Tighten the nuts to 8.5 Nm.
- Remove the wooden blocks or joiner's clamps carefully so that the springs are released.
- Reinsert all the necessary plugs and fix the cables with cable ties as previously (see also chapter 8.5.8).
- Refit the rear panel as described in chapter 8.1.2.
- Lift the wheelchair off the wooden blocks.
- Check all the wheelchair functions.
- If necessary, carry out adjustments to the setting screw on the stability lock system as described in chapter 8.24.5.
- Fit both the stability lock system protective caps.
  The protective caps on the stability lock system will either be held using a screw or a cable tie depending on the wheelchair's date of manufacture.

8.13 Bottom walking beam

Requirements:
- 5/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 1/2“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm



Removing the bottom walking beam:
- Remove the drive wheel as described in chapter 8.10.1.
- Remove the front castor housing as described in chapter 8.17.
- Remove the nut (4) with a 1/2" socket spanner.
- Remove the washer (1).
- Pull the bottom walking beam (3) off the axle.
- Take the spacer (2) off the axle.

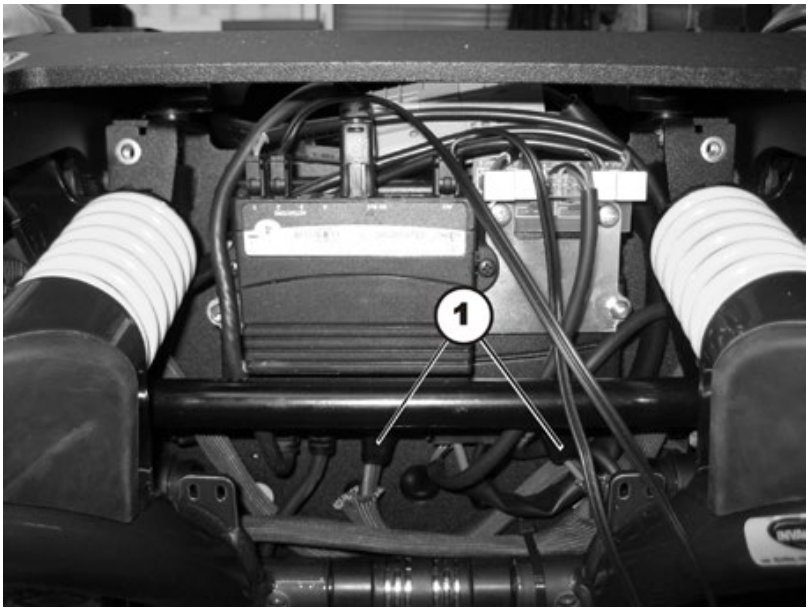
Refitting the bottom walking beam:
- Refit the parts in reverse order.
- Tighten the nuts (4) to 18 Nm.

8.14 Top walking beam

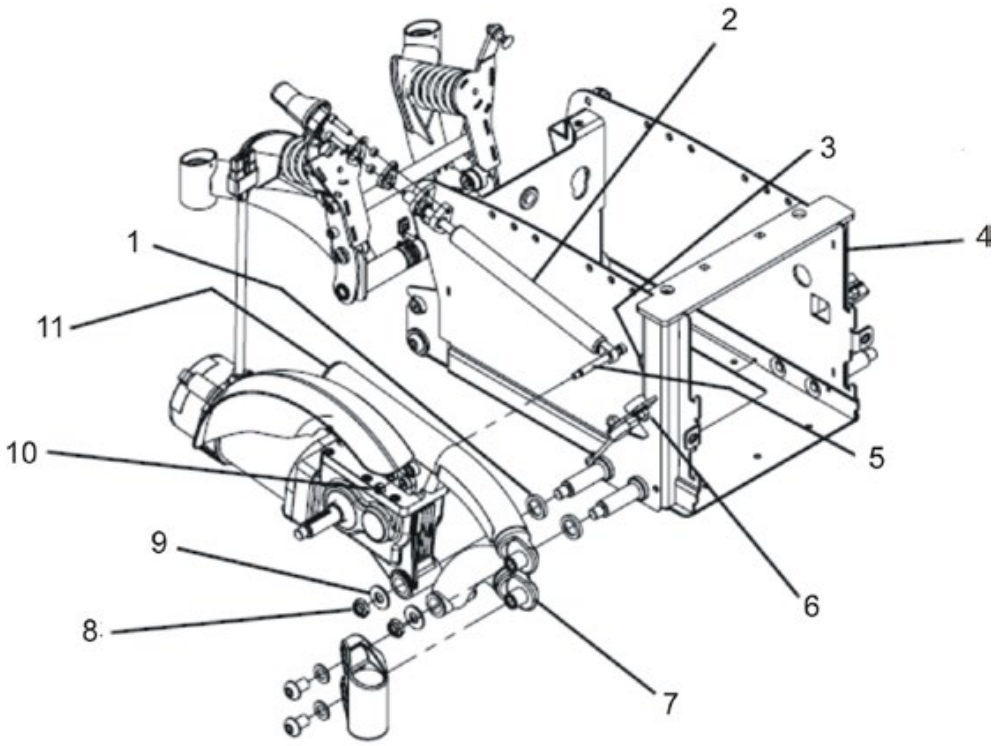
8.14.1 Removing the top walking beam

Requirements:
- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 1/4“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm

- Remove the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.
- Ensure you note the cable routing carefully. If necessary, take photos with a digital camera.
- Remove the drive wheel as described in chapter 8.10.1.
- Remove the front castor housing as described in chapter 8.24.
- Remove the rubber bumper as described in chapter 8.16.



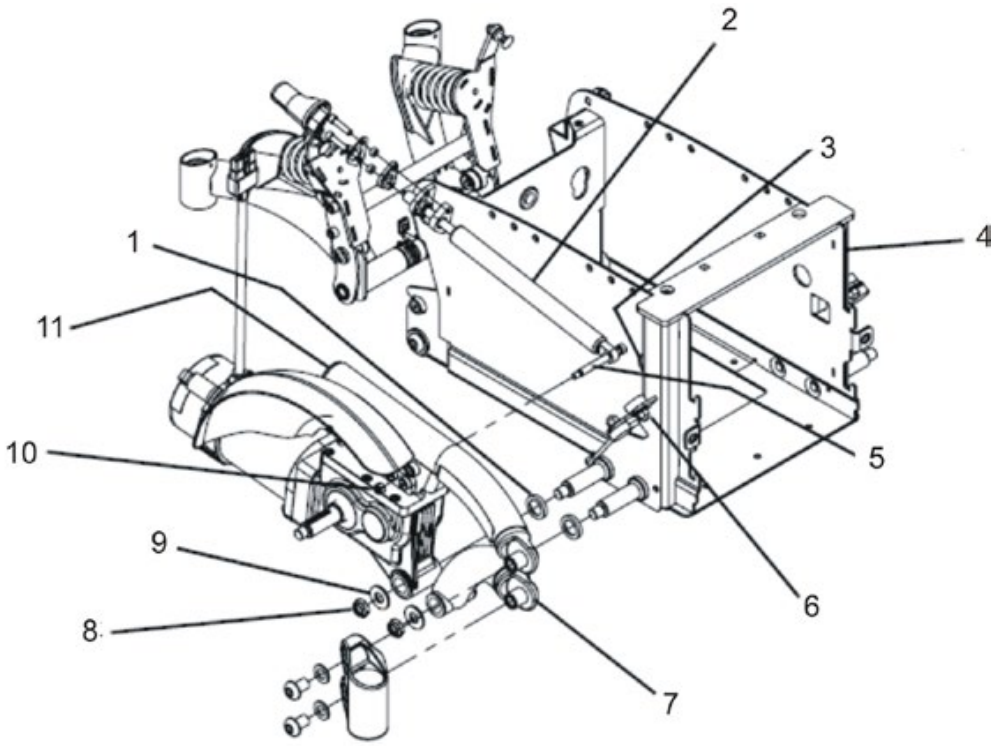
- Pull the motor plug (1) out of the electronic module.
- Note carefully how the motor cable is routed.
- If necessary, remove any existing cable ties which are fixing the motor cable.



- Rotate the top walking beam (11) until the Allen screw (5) is in line with the opening (3) in the battery case (4).
- Remove the nut (10), which secures the 5/16" Allen screw (5) using a 1/4" socket spanner.
- Push the Allen screw (5) towards the battery case until the gas cylinder is free of the top walking beam.
- Fix the gas cylinder in place with a cable tie or suitable adhesive tape.
- Remove the nut (8) with a 1/2" socket spanner.
- Remove the washer (9).
- Remove the top walking beam including motor/transmission unit from the axle.
- Remove the washer (1) from the axle.

8.14.2 Refitting the top walking beam

Requirements:
- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 1/4“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm



- Place the washer (1) on the battery case (4) rear axle.
- Push the top walking beam (11) including motor/transmission unit onto the axle.
- Push the washer (9) onto the axle.
- Fit the nut (8) onto the axle.
- Tighten the nut (8) to 18 Nm.
- Rotate the nut (8) back by 1/4 turn.
- Raise the rear wheel suspension to free the gas cylinder (2).
- Position the gas cylinder so that the 5/16 x2 .50" Allen screw (5) is in line with the opening (3) in the battery case (4).
- Rotate the top walking beam (11) until the drillhole for the Allen screw (5) is in line with the opening (3) in the battery case (4).
- Push the Allen screw (5) through the gas cylinder and the top walking beam.
- Fit the 1/4-20" nut (10) onto the Allen screw (5) and tighten it to 8.5 Nm.
- Refit the rubber bumper as described in chapter 8.16.
- Refit the front castor housing as described in chapter 8.17.

- Refit the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.
- Refit the rear panel as described in chapter 8.1.2.
- Refit the front panel as described in chapter 8.1.1.
- Fit the drive wheel as described in chapter 8.10.1.

8.15 Drive unit

8.15.1 Replacing the motor/transmission unit (Standard motor)

WARNING: Danger of crushing!

The wheelchair is very heavy. Danger of injury to the hands and feet!

- *Use proper lifting techniques.*

Danger of injury due to uncontrolled movement of the wheelchair!

- *Switch the vehicle's power system off (ON-/OFF key).*
- *Engage the drive motors.*
- *Secure the vehicle against rolling away by placing wedges under the wheels.*

ATTENTION: Danger of crushing!

The motor gearbox unit is extremely heavy. Injury hazards to hands!

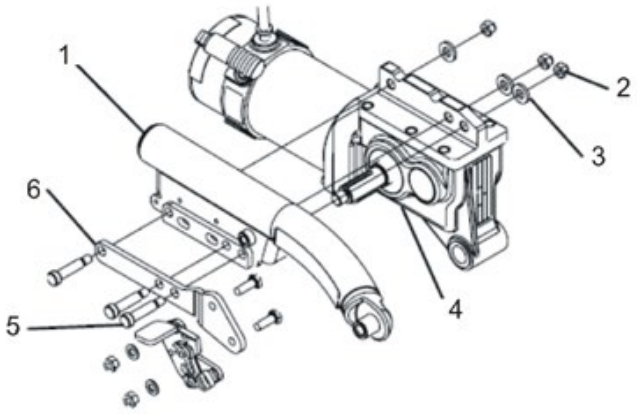
- *Please note the high weight*

Requirements:

- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- torque wrench 10 - 80 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm

Removing the motor/transmission unit:

- Remove the drive wheel as described in chapter 8.10.1.
- Remove the wheel hub as described in chapter 8.10.3.
- Remove the bottom walking beam as described in chapter 8.13.
- Remove the top walking beam as described in chapter 8.14.



- Loosen and remove the three nuts (2) with a 5/16" socket spanner.
- Remove the washers (3).
- Take note of the optional wheel lock (6) if fitted.

ATTENTION: Danger of crushing!

The motor gearbox unit is extremely heavy. Injury hazards to hands!

- *Please note the high weight*

- Pull the motor/transmission unit (4) off the bolt.

Refitting the motor/transmission unit:

- Replace the defective parts.
- Refit the motor/transmission unit in reverse order.
- Tighten the motor bolts (5) to 30 Nm.

8.15.2 Replacing the motor/transmission unit (SSD motor)

WARNING: Danger of crushing!

The wheelchair is very heavy. Danger of injury to the hands and feet!

- *Use proper lifting techniques.*

Danger of injury due to uncontrolled movement of the wheelchair!

- *Switch the vehicle's power system off (ON-/OFF key).*
- *Engage the drive motors.*
- *Secure the vehicle against rolling away by placing wedges under the wheels.*

ATTENTION: Danger of crushing!

The motor gearbox unit is extremely heavy. Injury hazards to hands!

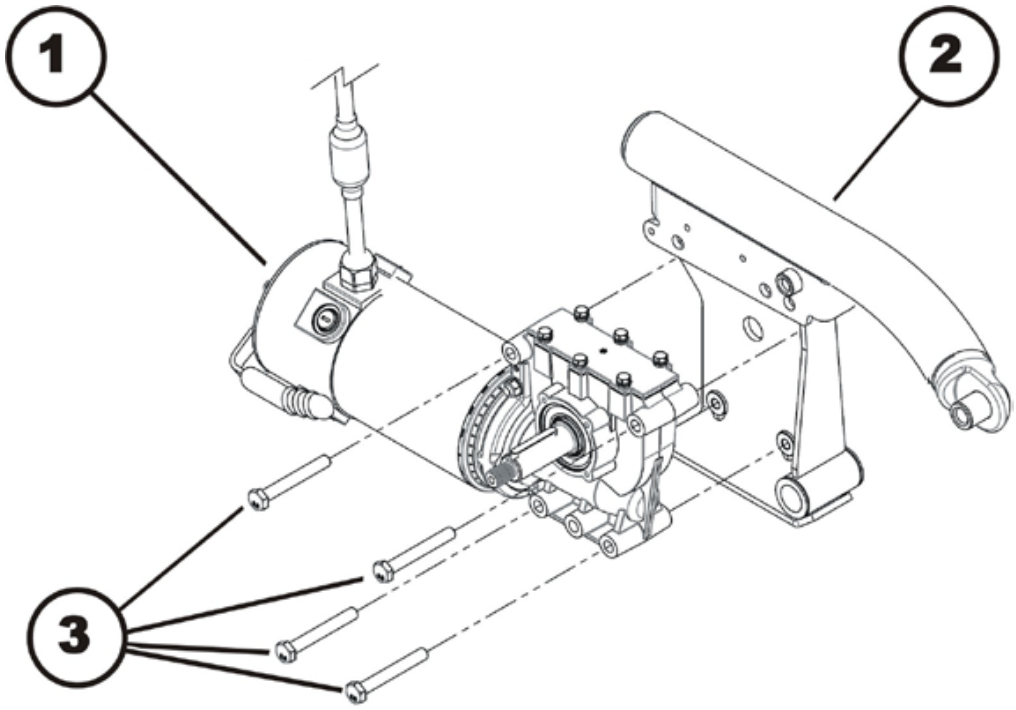
- *Please note the high weight*

Requirements:

- 6 mm Allenkey
- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 13 mm socket spanner
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- torque wrench 10 - 80 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm

Uninstalling the motor / gear box unit:

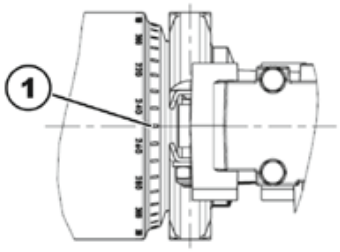
- Remove the rear battery box cover, as described in chapter 8.1.2 (TDX SP) or chapter 8.2.2 (TDX SP2).
- Disconnect the motor plug from the power module.
- Open the cable ties so you can freely access the motor cable.
- Remove the drive wheel, as described in chapter 8.10.1.
- Remove the wheel hub, as described in chapter 8.10.4.



- Use a 1/2" socket wrench to loosen the four hexagon head screws (3).
- Remove the screws.
- Pull the motor/gear box unit (1) off of the Walking Beam (2). Take into account the heavy weight of the unit.

Installing the motor / gearbox unit:

- Replace the defective components.
- Before installing a new motor / gearbox unit, make sure the sealing ring is correctly mounted. The sealing ring securely attaches the motor and the gearbox. The ring must be installed such that the self-locking nut is located on the outside.
- If the sealing ring is incorrectly installed, rotate it around as described in chapter 8.15.3.
- Install the motor / gearbox unit in reverse order.
- Use the scale to align the motor to the centre axis (1)
  2-pole motors and 4-pole motors:
  - Left: 0°
  - Right: 0°



- Make sure that the motor cable cannot be pinched or bent, and that it is not exposed to chafing in any place.
- To conclude, you should always carry out a trial run to test the vehicle functions.

8.15.3 Replacing or rotating the motor / gearbox unit sealing ring (SSD motor)

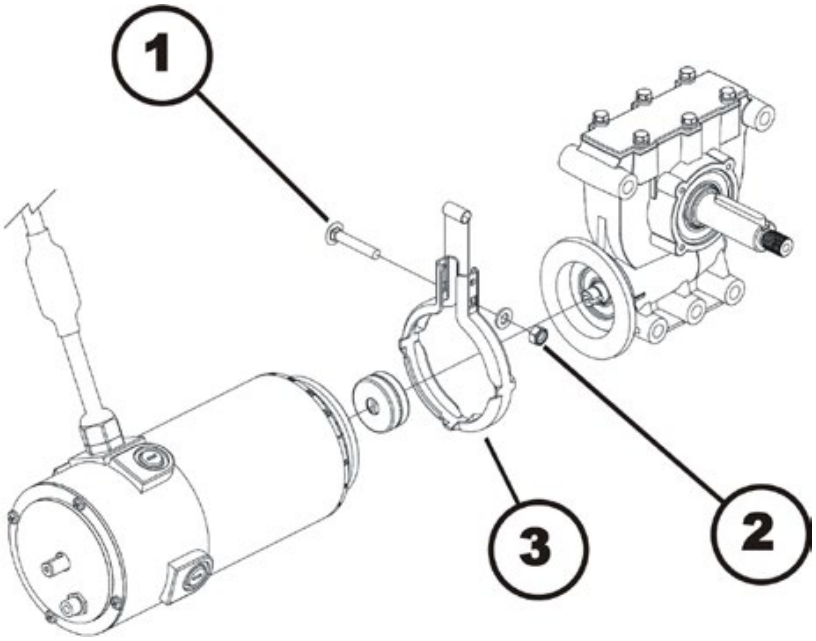
CAUTION: Danger of crushing!

The motor / gearbox unit is very heavy. Danger of injury to the hands!

- *Pay attention to the heavy weight.*

Requirements:

- 6 mm Allen key
- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 10 mm socket spanner
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 25 Nm (or similar)
- torque wrench 10 - 80 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm



Uninstalling the sealing ring:

- Uninstall the motor / gearbox unit, as described in chapter 8.15.2.
- Use the 10 mm socket wrench to loosen and remove the self-securing nuts (2) including the washers.
- Remove the carriage bolt (2), which secures the sealing ring (3).
- Carefully bend the sealing ring apart and remove it.

Installing the sealing ring:

- Install the sealing ring so that the square hole for the carriage bolt is on the inside of the wheelchair.
- Insert the carriage bolt through the sealing ring.
- Install the washer and the self-locking nut.
- Do not tighten the self-locking nut completely, as the motor orientation must be adjusted during installation.

8.15.4 Replacing the motor/transmission clutch (Standard Motor)

CAUTION: Danger of crushing!

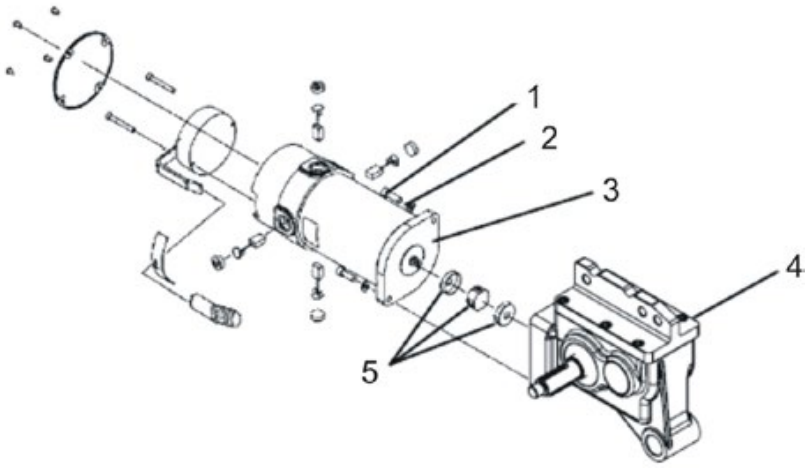
The motor / gearbox unit is very heavy. Danger of injury to the hands!

- *Pay attention to the heavy weight.*

Requirements:

- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- 6 mm Allen key
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 5 - 25 Nm (or similar)
- torque wrench 10 - 80 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm

Removing the motor/transmission clutch:



- Remove the motor/transmission unit as described in chapter 8.15.1.
- Loosen the two Allen screws (1) with a 6 mm Allen key and remove them including the washers (2).

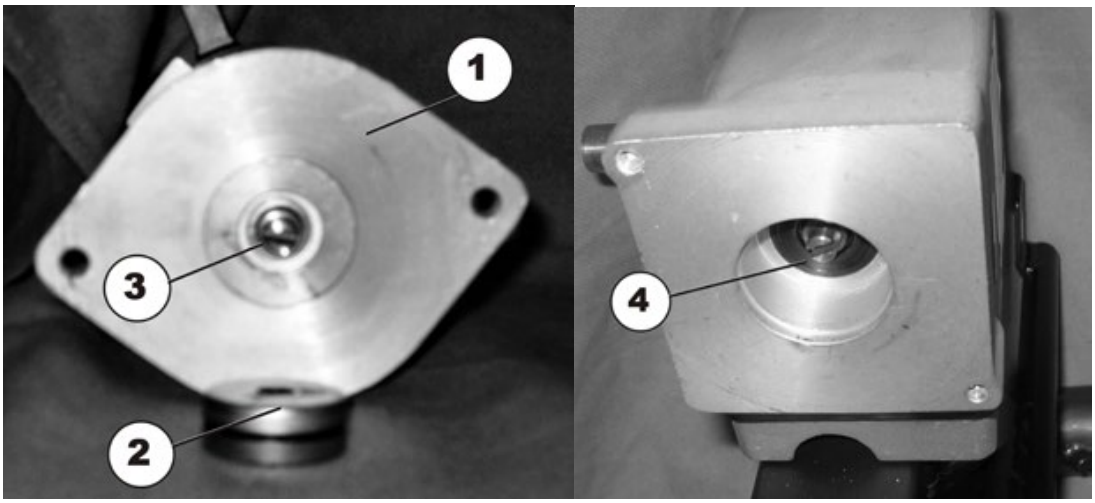
WARNING!

Material damage hazard if the coupling is improperly handled.

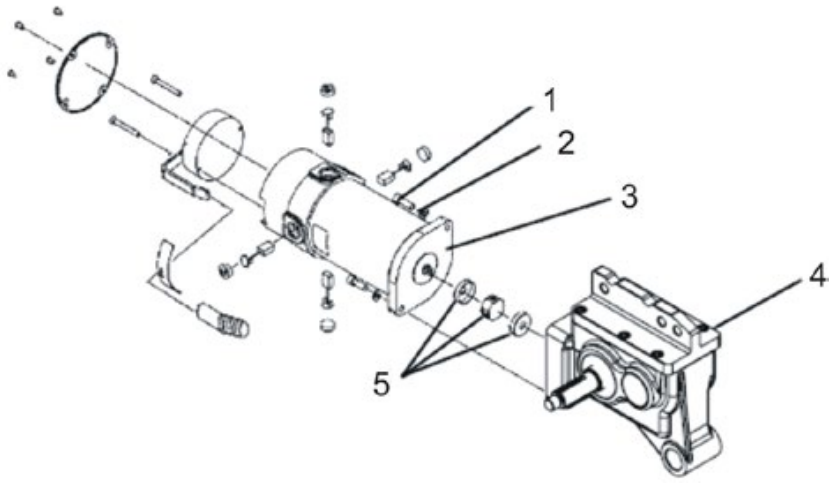
- *Please proceed carefully so that you do not damage the motor-gearbox coupling.*

- Pull the motor (3) and transmission unit (4) carefully apart.
- Remove the clutch individual parts (5).
- Replace the clutch if necessary.

Refitting the motor/transmission clutch:



- Place the new clutch (2) on the motor axle (3). Note the position of the groove.
- Push the motor carefully into the transmission. Observe the position of the groove in the transmission axle (4). If necessary, rotate the transmission axle into the right position.



- Refit the two M6 Allen screws (1) including washers (2). Tighten the Allen screws to 8.5 Nm.
- Refit the motor/transmission unit as described in chapter 8.15.1.

8.15.5 Replacing the motor/transmission clutch (SSD Motor)

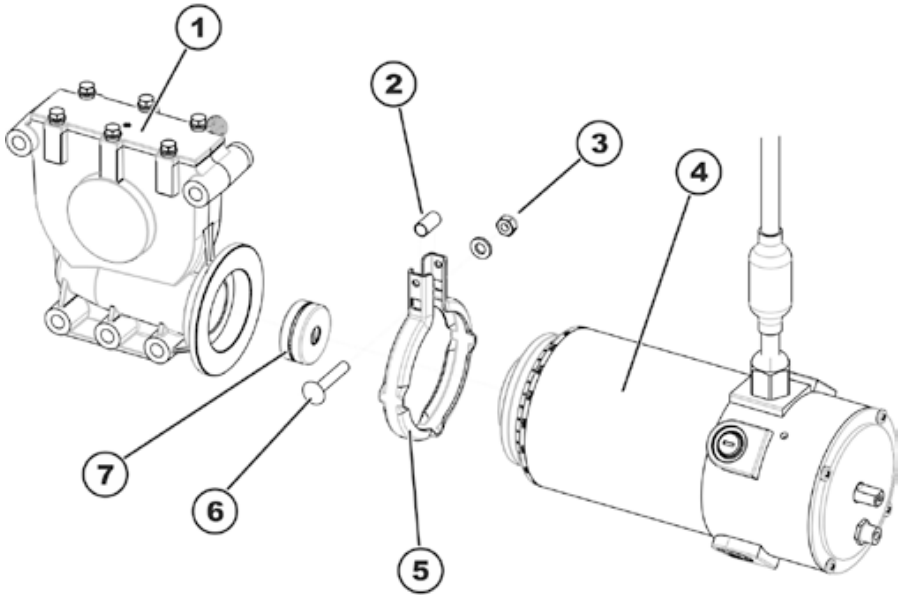
CAUTION: Danger of crushing!

The motor / gearbox unit is very heavy. Danger of injury to the hands!

- *Pay attention to the heavy weight.*

Requirements:

- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- 6 mm Allen key
- Phillips screwdriver size 2
- 10 mm socket spanner
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 0 - 20 Nm (or similar)
- torque wrench 5 - 25 Nm (or similar)
- torque wrench 10 - 80 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm



Uninstalling the motor / gearbox coupling:

- Uninstall the motor / gearbox unit, as described in chapter 8.15.2.
- Use the 10 mm socket wrench to loosen and remove the self-securing nut (3).
- Remove the carriage bolt (6), which secures the sealing ring (5).
- Carefully bend the sealing ring apart and remove it.

WARNING!

Material damage hazard if the coupling is improperly handled.

- *Please proceed carefully so that you do not damage the motor-gearbox coupling.*

- Pull the motor (4) and transmission unit (1) carefully apart.
- Remove the clutch individual parts (7).
- Replace the clutch if necessary.

Refitting the motor/transmission clutch:

- Place the new clutch (7) on the motor axle. Pay attention to the position of the groove.
- Position the locking ring (5) on the motor (4) or the gearbox (1).
- Carefully insert the motor into the gearbox. Pay attention to the position of the groove in the axle of the gearbox. If necessary, rotate the motor and gearbox to the correct position.
- Insert the carriage bolt through the locking ring. Do not forget the spacer sleeve (2)!
- Install the washer and the self-locking nut.
- Do not tighten the self-locking nut completely, as the motor orientation must be adjusted during installation.
- Install the motor / gearbox unit, as described in chapter 8.15.2.

8.15.6 Replacing the carbon brushes (SSD motor)

Note
Always replace all the carbon brushes on both motors.

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

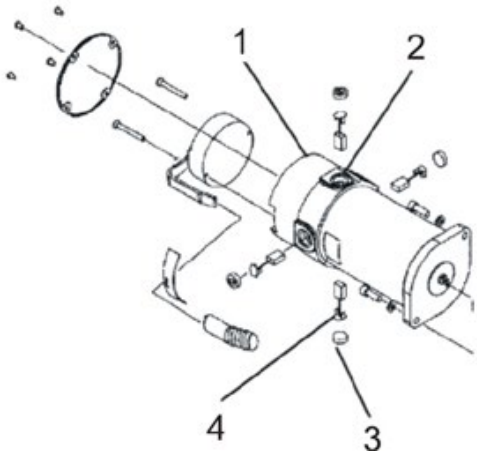
- *Use proper lifting techniques.*

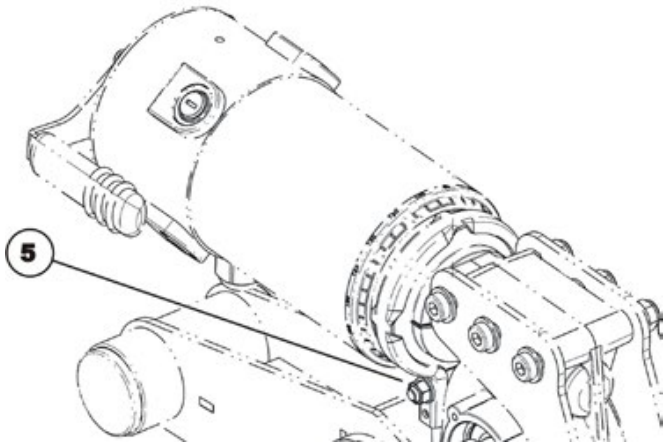
Requirements:

- 5 mm Allen key
- 6mm Allen key
- 10 mm socket spanner
- 19 mm socket spanner
- Screwdriver
- two long wooden blocks, min. 14 x 14 x 30 cm

Removing the carbon brushes:

- Switch the wheelchair off.
- Remove the drive wheels as described in chapter 8.10.1.





- Disengage the motor (1) by setting the engaging lever to "Push".

Note
In the case of the SSD motor, you can unto the bolt (5) with a 10 mm socket spanner and then turn the motor around so that you can access the rear carbon brushes more easily.

- Undo all four plastic caps (3) with a blade screwdriver and remove the caps.
- Pull the carbon brushes (4) a little out of the brush holder. Note the fixing position and location of the carbon brushes.

Note
If the carbon brushes were checked but not replaced, you must know their exact fitting position. Used carbon brushes need to the refitted exactly in the same position from which they were taken in order to guarantee optimum contact to the collector.

- Make a marking on the motor and the carbon brushes in order to guarantee correct refitting.
- Remove the carbon brushes complete from the mounting (2).
- Check the carbon brushes and springs for the level of wear, broken components or discolouration.

Refitting the carbon brushes:

- Depending on the condition of the brushes and the spring:
  - either replace the brushes in exactly the same position from which they were taken or
  - fit new brushes.
- Replace the plastic caps and tighten them.
- Refit the top walking beams as described in chapter 8.14.2.
- Refit the bottom walking beams as described in chapter 8.13.
- Refit the drive wheels as described in chapter 8.10.1.

Note
The following procedure is necessary to run the carbon brushes in after replacement and to therefore guarantee maximum performance.

WARNING: Risk of accidents!

Hazards to workers, surroundings and mobility device!

- *Do not leave the mobility device unattended during the following procedure!*
- *Stellen Sie sicher, dass BEIDE Antriebsräder angehoben werden und den Boden nicht berühren können.*
- *Secure the area.*

- Lift the wheelchair up on one side and place a 14 cm high wooden block underneath it so that the drive wheel is suspended freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Allow the motors to run in the forward direction for an hour.
- Allow the motors to cool down for 30 minutes.
- Allow the motors to run in the reverse direction for an hour.
- Lift the wheelchair off the wooden blocks.

8.15.7 Replacing the carbon brushes (Standard motor)

Note
Always replace all the carbon brushes on both motors.

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

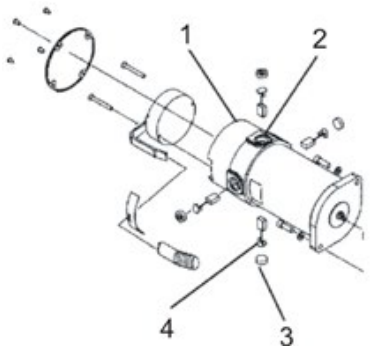
- *Use proper lifting techniques.*

Requirements:

- 5/8“ Allen key
- 7/8“ Allen key
- 5/16“ Allen key
- blade screwdriver
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- two long wooden blocks, min. 14 x 14 x 30 cm

Removing the carbon brushes:

- Switch the wheelchair off.
- Remove the drive wheels as described in chapter 8.10.1.
- Remove the bottom walking beams as described in chapter 8.13.
- Remove the top walking beams as described in chapter 8.14.



- Disengage the motor (1) by setting the engaging lever to "Push".
- Undo all four plastic caps (3) with a blade screwdriver and remove the caps.
- Pull the carbon brushes (4) a little out of the brush holder. Note the fixing position and location of the carbon brushes.

Note
If the carbon brushes were checked but not replaced, you must know their exact fitting position. Used carbon brushes need to the refitted exactly in the same position from which they were taken in order to guarantee optimum contact to the collector.

- Make a marking on the motor and the carbon brushes in order to guarantee correct refitting.
- Remove the carbon brushes complete from the mounting (2).
- Check the carbon brushes and springs for the level of wear, broken components or discolouration.

Refitting the carbon brushes:

- Depending on the condition of the brushes and the spring:
  - either replace the brushes in exactly the same position from which they were taken or
  - fit new brushes.
- Replace the plastic caps and tighten them.
- Refit the top walking beams as described in chapter 8.14.2.
- Refit the bottom walking beams as described in chapter 8.13.
- Refit the drive wheels as described in chapter 8.10.1.

Note
The following procedure is necessary to run the carbon brushes in after replacement and to therefore guarantee maximum performance.

WARNING: Risk of accidents!

Hazards to workers, surroundings and mobility device!

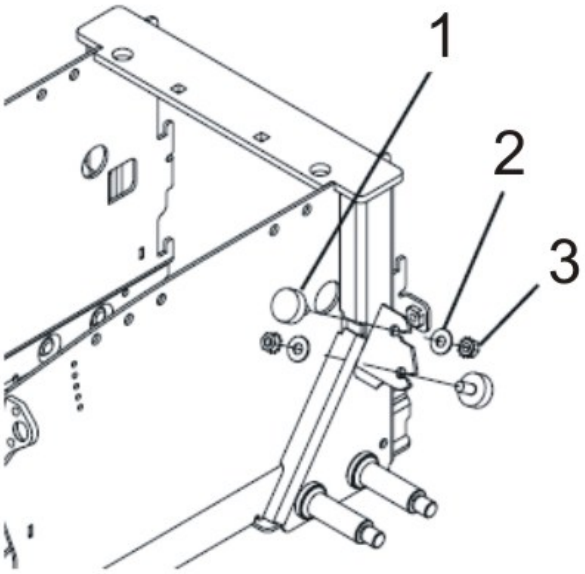
- *Do not leave the mobility device unattended during the following procedure!*
- *Make sure that BOTH drive wheels are off the ground before calibrating.*
- *Secure the area.*

- Lift the wheelchair up on one side and place a 14 cm high wooden block underneath it so that the drive wheel is suspended freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Allow the motors to run in the forward direction for an hour.
- Allow the motors to cool down for 30 minutes.
- Allow the motors to run in the reverse direction for an hour.
- Lift the wheelchair off the wooden blocks.

8.16 Replacing the rubber bumper

Note
Invacare® recommends that you replace all the rubber bumpers as soon as one needs replacing.

Requirements:
- 5/16“ socket spanner
- 7/8“ Allen key
- two long wooden blocks, min. 14 x 14 x 30 cm
- torque wrench 5 - 25 Nm (or similar)

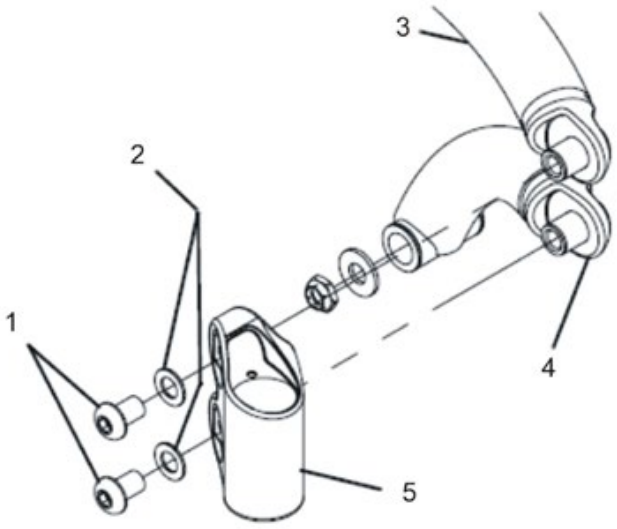


Removing the rubber bumper:
- Remove the drive wheel as described in chapter 8.10.1.
- Undo and remove the 5/16" nut (3).
- Remove the washer (2).
- Remove the rubber bumper (1).

Refitting the rubber bumper:
- Refit the parts in reverse order.

8.17 Castor housing front

Requirements:
- 5/16“ Allen key
- torque wrench 5 - 25 Nm (or similar)



Removing the front castor housing:

- Remove the two Allen screws (1) with a 5/16" Allen key.
- Remove the two nylon washers (2).
- Remove the castor housing (5) from the top walking beam (3) and the bottom walking beam (4).

Refitting the front castor housing:

- Refit the parts in reverse order.
- Tighten the Allen screws to the following sequence:
  - tighten all the screws to 18 Nm.
  - turn the screws back by
    1/8 turn

8.18 Seat system

8.18.1 Replacing tilt module / lifter module

Note
Depending on which tilt module is installed, either chapter 8.18.1.1 or 8.18.1.2 applies. You can determine the type of tilt module by the maximum adjustment angle it allows:
- Max. angle is larger than 30°: See chapter 8.18.1.1
- Max. angle is smaller than 30°: See chapter 8.18.1.2

8.18.1.1 Replacing the tilt module (max. > 30°) (without a lifter)

Note
This chapter discusses how to replace a tilt module (max. > 30°) on a chair without a lifter.

Similar tasks are described In the following chapters:
- Replacing only the seat support – chapter 8.18.5
- Replacing a tilt module (max. < 30°) – chapter 8.18.1.2
- Replacing a combined lifter/tilt module – chapter 8.18.2
- Replacing only the tilt actuator – chapter 8.18.3
- Replacing only the lifter actuator – chapter 8.18.4

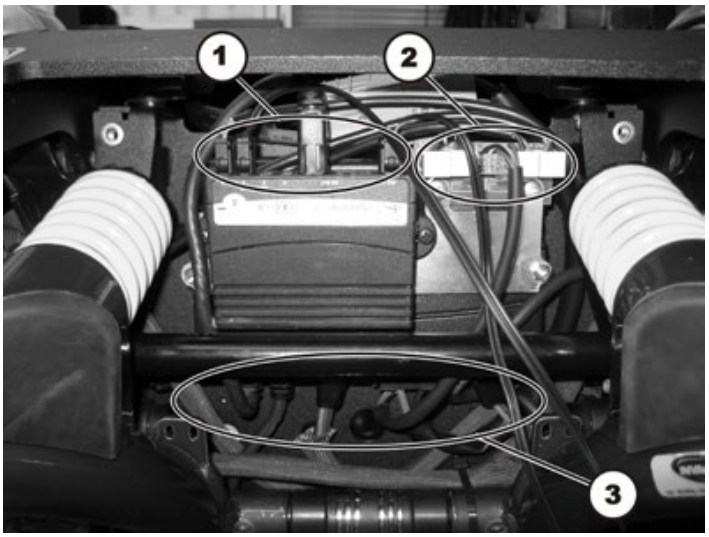
WARNING: Danger of crushing!

The seat and the tilt module are very heavy. Injury hazard to hands and feet!
- *Use proper lifting techniques.*

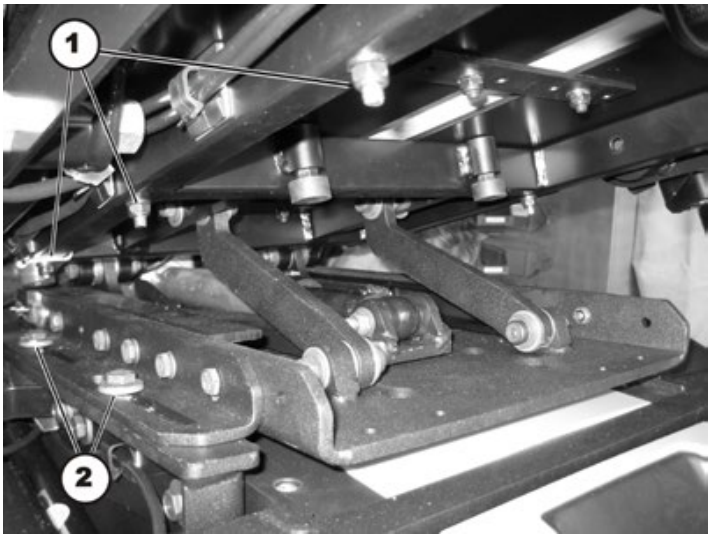
Requirements:
- Phillips screwdriver size 2
- 1/2“ socket spanner
- 13/32“ socket spanner
- 5/32“ Allen key
- oblique pliers
- cable ties

Note
Make sure you have noted the seat settings. Mark the fitting positions, alignment etc. If necessary, take photos with a digital camera.
Any changes to the seat settings influence the centre of gravity of the wheelchair. If changes are made to the seat settings, the stability lock system settings must be checked and readjusted if necessary, as described in chapter 8.24.5.

Removing the tilt module:
- Remove the legrests.
- Remove the seat cushion.
- Activate the tilt module to tilt the seat a little towards the rear.
- Remove the rear panel as described in chapter 8.1.2.



- Pull the tilt module plug (1) out of the actuator module.
- Unclip the cable. Remove any cable ties which are fitted.



- Undo the six nuts (1) with a 13/32" socket spanner and remove the six 5/32" Allen screws.

WARNING: Danger of crushing!

The seat and the tilt module are very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

- Lift the seat up off the tilt module. Use proper lifting techniques.
- Loosen the four bolts (2) with a 1/2" socket spanner.
- Lift the tilt module off the seat support. Use proper lifting techniques.

Refitting the tilt module:

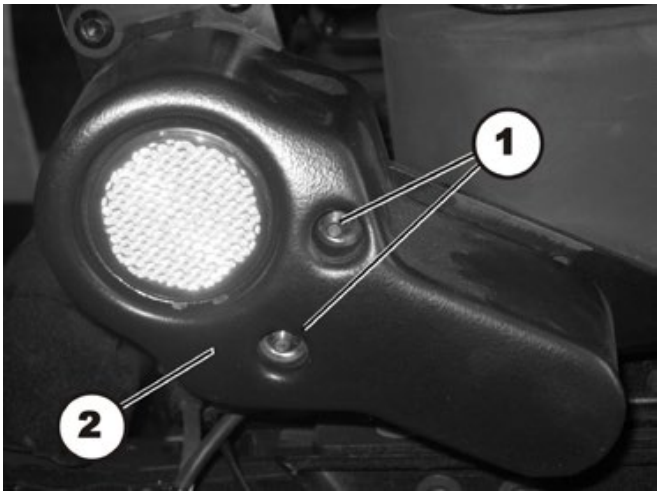
- Refit the parts later in reverse order.

Replacing the tilt module microswitch

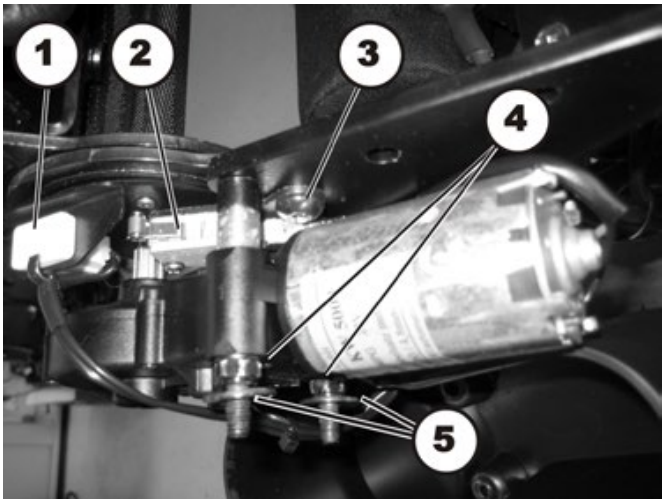
Requirements:
- socket spanner, 10 mm
- 5 mm Allen key
- oblique pliers
- cable ties

Note
Either two microswitches, or one microswitch and an angular sensor, can be fitted. The angular sensor, see sub chapter "**Replacing the tilt module angular sensor**" Page 140.

Removing the tilt module microswitch:



- Undo and remove the two cap nuts (1) on the right-hand plastic cover (2) with a 10 mm socket spanner.
- Remove the plastic cover.



- Remove the two washers (5).
- Loosen and remove the two nuts (4) with a 10 mm socket spanner.

- Remove the servo motor including transmission.
- Undo the cable and plug for the microswitch. Remove any cable ties which are fitted.
- Undo the Allen screws (3) with a 5 mm Allen key.
- Take the microswitch mounting off.
- Replace the microswitch.

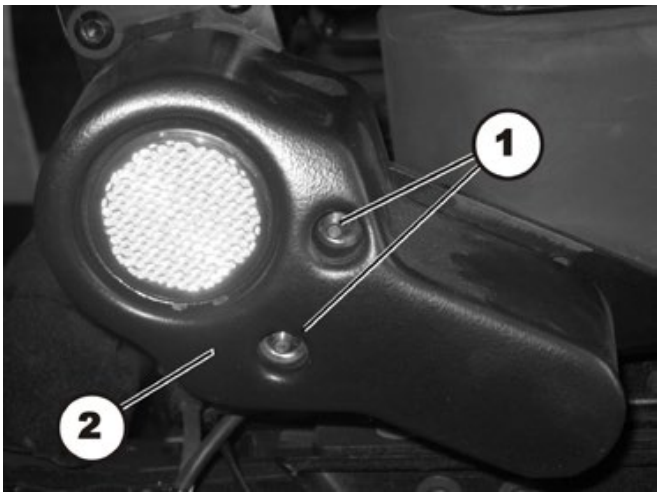
Refitting the tilt module microswitch:

- Refit the parts later in reverse order.

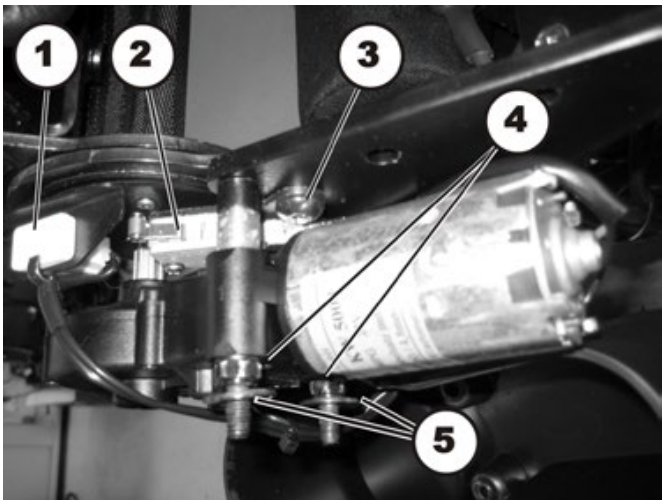
Replacing the tilt module angular sensor

Requirements:
- socket spanner, 10 mm
- oblique pliers
- cable ties

Removing the tilt module angular sensor:



- Undo and remove the two cap nuts (1) on the right-hand plastic cover (2) with a 10 mm socket spanner.
- Remove the plastic cover.



- Undo the cable and the plug from the angular sensor (1). Remove any cable ties which are fitted.
- Remove the cable ties holding the angular sensor.
- Replace the angular sensor.

Refitting the angular sensor:
- Refit the parts later in reverse order.

8.18.1.2 Replacing the tilt module (max. < 30°) (without a lifter)

Note
This chapter discusses how to replace a tilt module (max. > 30°) on a chair without a lifter.

Similar tasks are described In the following chapters:
- Replacing only the seat support – chapter 8.18.5
- Replacing a tilt module (max. > 30°) – chapter 8.18.1.1
- Replacing a combined lifter/tilt module – chapter 8.18.2
- Replacing only the tilt actuator – chapter 8.18.3
- Replacing only the lifter actuator – chapter 8.18.4

WARNING: Danger of crushing!

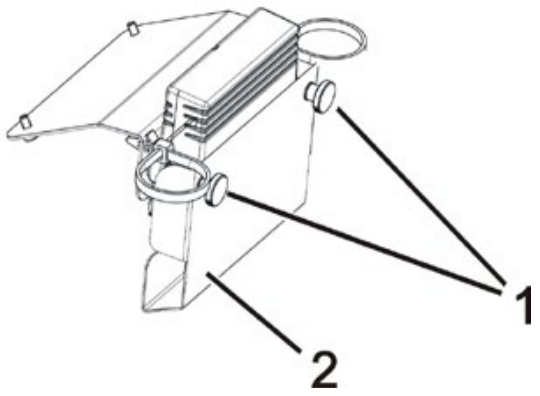
The seat is very heavy. Injury hazard to hands and feet!
- *Use proper lifting techniques.*

Requirements:
- 1/2“ socket spanner
- 13 mm jaw spanner
- 4 mm Allen key
- 6 mm Allen key
- oblique pliers
- cable binder

Note
Make a careful note of the seat settings. Mark the fitting positions, alignments etc, and take photos with a digital camera if necessary.
Every change to the seat settings influences the centre of gravity of the mobility device. If the seat settings are changed, the stability lock system settings must be checked and readjusted if necessary as described in chapter 8.24.5.

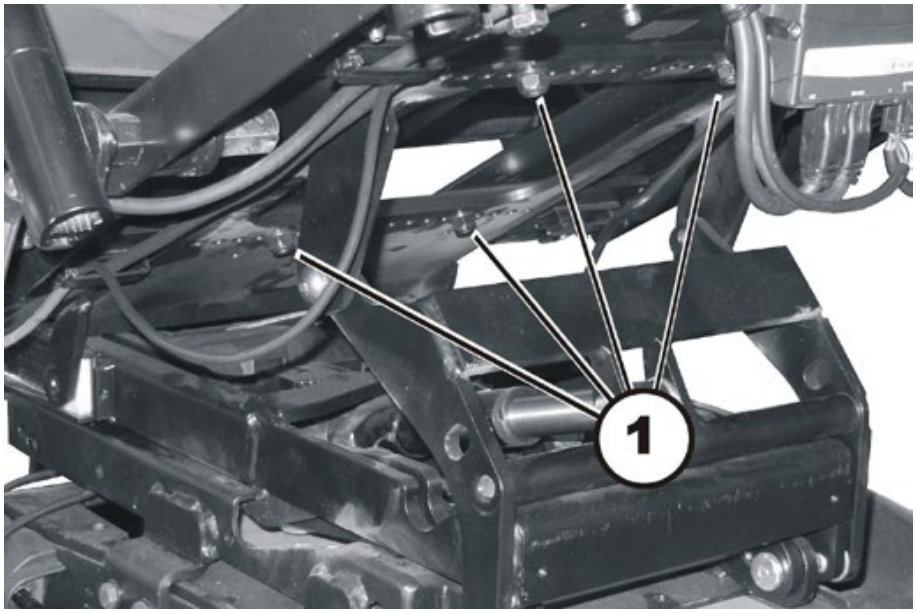
Removing the tilt module:
- If possible, tilt the seat with the tilt module as far as possible to the rear.
- Switch the controller off.
- Remove the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.

The actuator module for the lifter and the tilt actuators is fitted to the front edge of the seat support.



- Remove the two knurled screws (1) including washers.
- Remove the cover (2).

- Pull the plug out of the actuator module.
- Open the cable holder on the underside of the seat.
- Uncover all the cables so that you can lift the seat up.

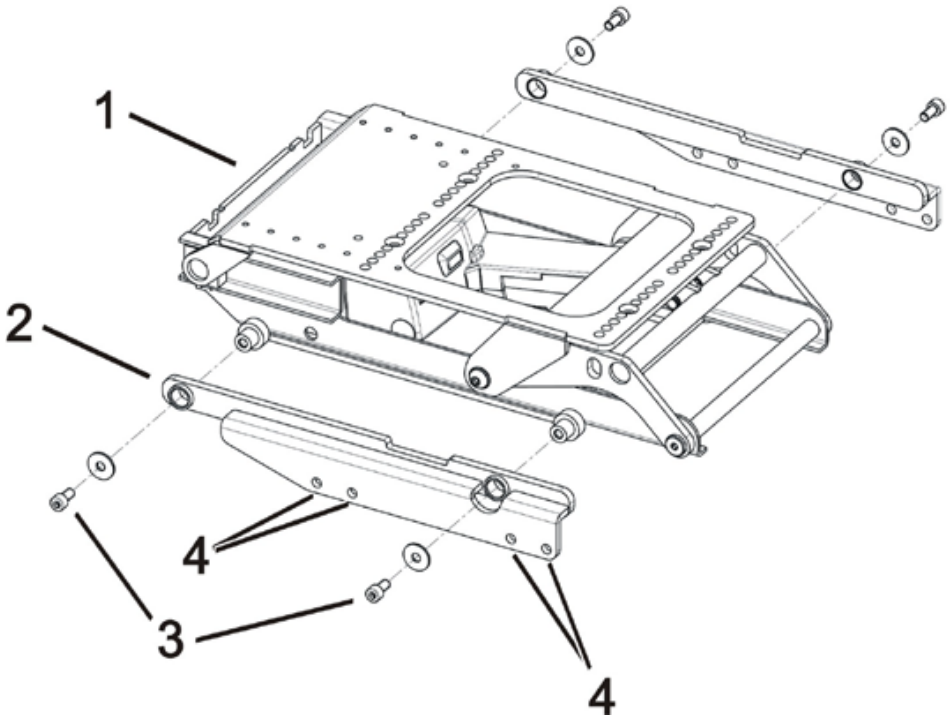


WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

- Undo the four bolts (1) which connect the seat to the tilt module using a 4 mm Allen key and a 13 mm open spanner.
- Lift the seat off the lifter / tilt module. Use proper lifting techniques.



- Undo the two Allen screws (3) on both sides of the seat with a 6 mm Allen key.
- Remove the screws and the washers.
- Lift the tilt module (1) off the battery case.
- If one of the tilt mountings (2) needs to be replaced:
  - undo the four bolts (4) on the appropriate side of the seat using a ½“ socket spanner.
  - remove the tilt mounting.

Refitting the tilt module:

- Refit the tilt module in the reverse sequence.
- Tighten the connecting bolts between the tilt mounting and the battery case to 18 Nm.
- When routing the cable, ensure that it has been placed in the cable clamps so that it cannot be crushed or damaged in any way at any seat setting.
- Refit the batteries including battery supports as described in chapters 8.5.2/8.5.3 and 8.5.1.

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

- Refit the seat.
- Adjust the stability lock system as described in chapter 8.24.5.

8.18.2 Replacing the lifter / tilt module

Note
This chapter deals with replacing the seat support for a seat with lifter / tilt module.
Similar work is described in the following chapters:
- Replacing a seat support only - chapter 8.18.5
- Replacing a tilt module (max. > 30°) - chapter 8.18.1.1
- Replacing a tilt module (max. < 30°) - chapter 8.18.1.2
- Replacing the tilt actuator only - chapter 8.18.3
- Replacing the lifter actuator only - chapter 8.18.4

WARNING: Danger of crushing!

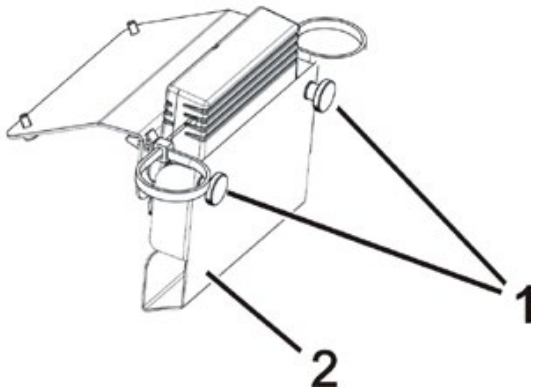
The seat is very heavy. Injury hazard to hands and feet!
- *Use proper lifting techniques.*

Requirements:
- Crosshead screwdriver size 1
- 1/2“ socket spanner
- 13 mm jaw spanner
- 6 mm wrench
- 4 mm Allen key
- oblique pliers
- cable binder

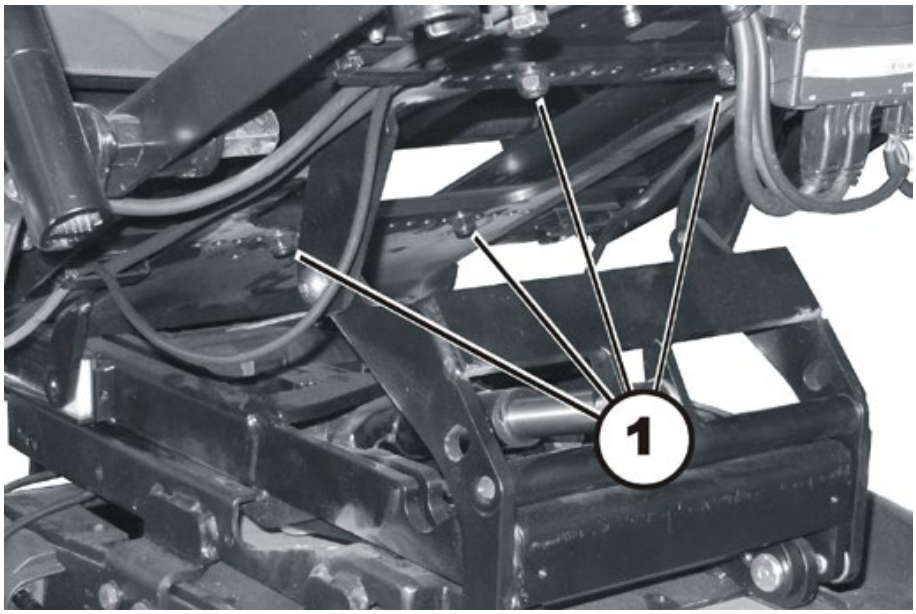
Note
Make a careful note of the seat settings. Mark the fitting positions, alignments etc, and take photos with a digital camera if necessary.
Every change to the seat settings influences the centre of gravity of the mobility device. If the seat settings are changed, the stability lock system settings must be checked and readjusted if necessary as described in chapter 8.24.5.

Removing the lifter/tilt module:
- Run the lifter up to the top position if possible.
- If possible, tilt the seat with the tilt module as far as possible to the rear.
- Switch the controller off.
- Remove the batteries as described in chapters 8.5.1 and 8.5.2.

The actuator module for the lifter and the tilt actuators is fitted to the front edge of the seat support.



- Remove the two knurled screws (1) including washers.
- Remove the cover (2).
- Pull the plug out of the actuator module.
- Open the cable holder on the underside of the seat.
- Uncover all the cables so that you can lift the seat up.

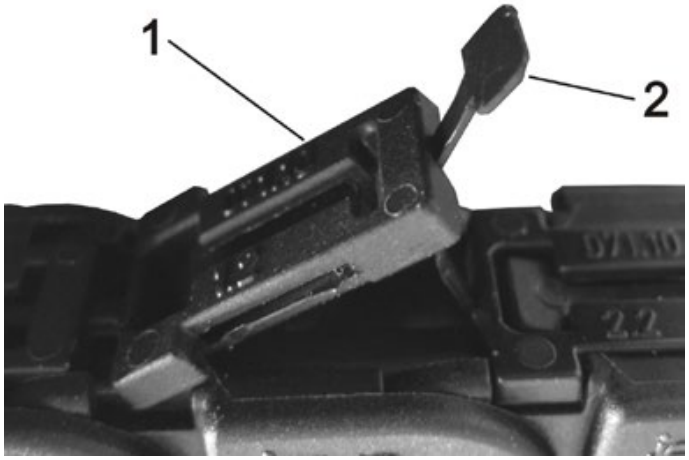


WARNING: Danger of crushing!

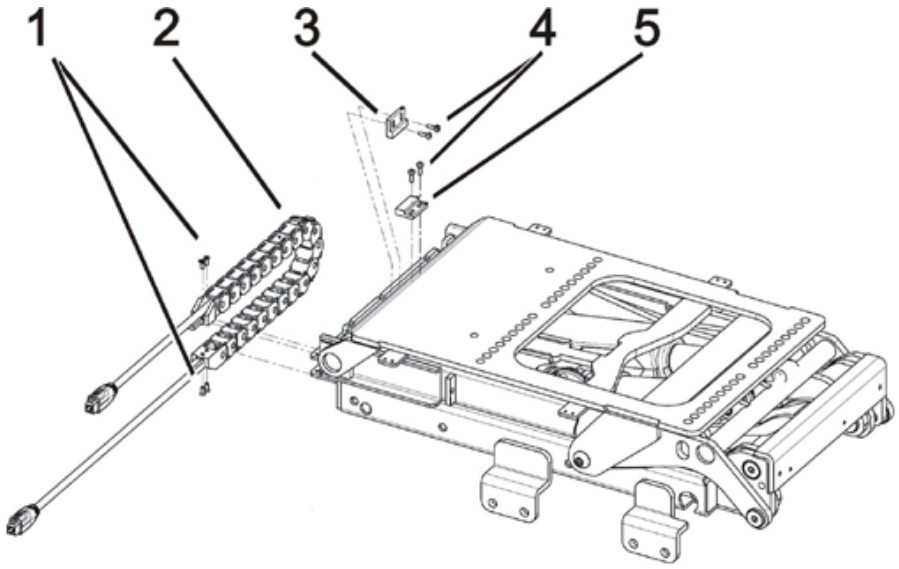
The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

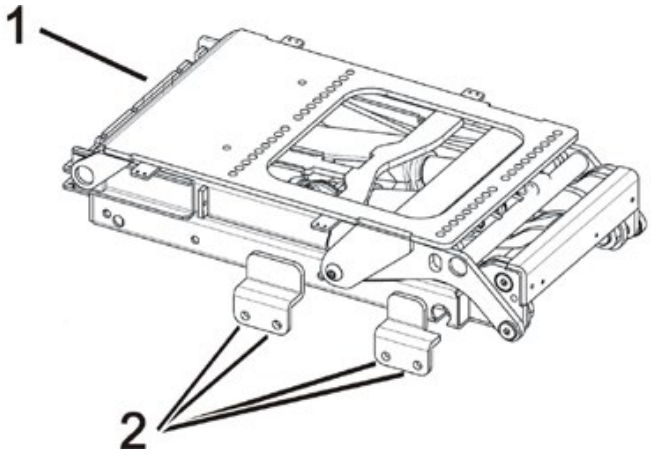
- Undo the four bolts (1) which connect the seat to the lifter/tilt module using a 4 mm Allen key and a 13 mm open spanner.
- Lift the seat off the lifter / tilt module. Use proper lifting techniques.



- Open the lifter energy chain:
  - lift the cover (1) up.
  - pull the tab (2) out of the cover.
  - repeat this part by part.
- Remove the two cable ties which fix the cable to the ends of the energy chain.
- Pull the cable out of the energy chain.



- Use the Phillips screwdriver to loosen the screws (1).
- Remove the power supply chain (2).
- Use the Phillips screwdriver to loosen the screws (4).
- Additionally the sensor (5) is secured with nuts.
  Loosen the nuts by holding against a 6 mm wrench.
- Remove the magnet (3).
- Remove the sensor (5).



- Undo the four bolts (2) on both sides of the seat using a ½“ socket spanner.
- Lift the lifter/tilt module off the battery case.

Refitting the lifter/tilt module:

- Refit the lifter/tilt module in the reverse sequence.
- Tighten the connecting bolts between the lifter/tilt module and the battery case to 18 Nm.
- When routing the cable, ensure that it has been placed in the cable clamps so that it cannot be crushed or damaged in any way at any seat setting.
- Refit the batteries including battery supports as described in chapters 8.5.2 and 8.5.1.

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

- Refit the seat.
- Adjust the stability lock system as described in chapter 8.24.5.

8.18.3 Replacing the tilt actuator

Note
This chapter only deals with the replacement of the tilt actuator.
If you wish to replace the complete tilt module, please proceed as described in chapter 8.18.1.2 or 8.18.2.

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands if the seat is unintentionally folded down!

- *Use proper lifting techniques.*
- *Ensure that the seat is properly secured before you start removing the actuator.*

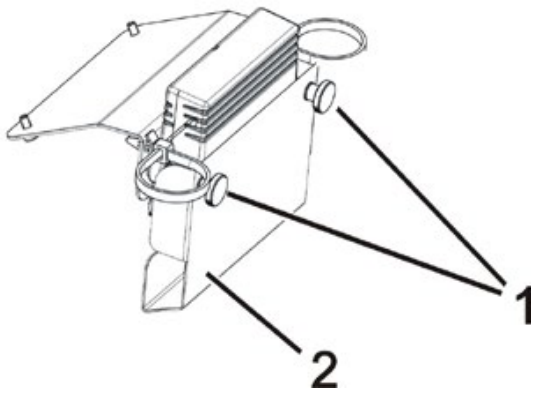
Requirements:
- retaining ring pliers
- oblique pliers
- cable binder

Note
Make a careful note of the seat settings. Mark the fitting positions, alignments, cable routing etc, and take photos with a digital camera if necessary.
Every change to the seat settings influences the centre of gravity of the mobility device. If the seat settings are changed, the stability lock system settings must be checked and readjusted if necessary as described in chapter 8.24.5.

Removing the tilt actuator:

- Run the lifter up to the top position if possible.
- If possible, tilt the seat with the tilt module as far as possible to the rear.
- Switch the controller off.

The actuator module for the lifter and the tilt actuators is fitted to the front edge of the seat support.



- Remove the two knurled screws (1) including washers.
- Remove the cover (2).
- Pull the plug out of the actuator module.
- Open the cable holder on the underside of the seat.
- Uncover the actuator cable so that you can pull it out of the tilt module later on together with the actuator.

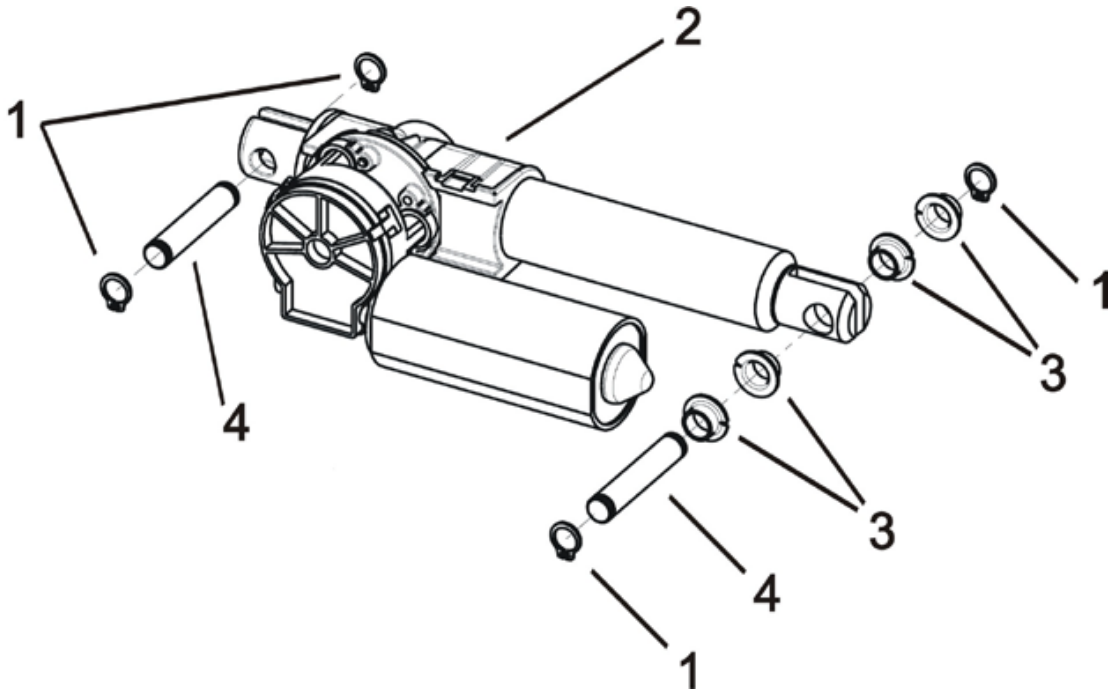
WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands if the seat is unintentionally folded down!

- *Use proper lifting techniques.*

- Ensure that the seat is properly secured against unintentional folding down before you start removing the actuator.
  If you are unable to secure the seat, you must remove it completely.

If you are working on a combined lifter/tilt module, the tilt actuator is located in the upper section of the module.



- Remove the retaining ring (1) with the retaining ring pliers.
- Push the bolts (4) out of the guides. When removing the front bolts, take care with the bushes (3).
- Remove the actuator from the tilt module.

Refitting the tilt actuator:

- Refit all parts in the reverse sequence
- Carry out a performance test.

8.18.4 Replacing the lifter actuator

Note
This chapter only deals with the replacement of the lifter actuator.
If you wish to replace the complete lifter module, please proceed as described in chapter 8.18.2.

Possible methods:

The lifter actuator is very easy to replace if the lifter has been raised completely. Replacement is slightly more complicated if the lifter is in the lowered position and cannot be run up. The work required for both methods is described below.

- If you wish to replace the lifter when it is in the raised position, please proceed as described in chapter 8.18.4.1.
- If you wish to replace the lifter when it is in the lowered position, please proceed as described in chapter 8.18.4.2.

8.18.4.1 Method 1 - Removing the lifter actuator when the lifter is raised

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands if the seat is unintentionally folded down!

- *Use proper lifting techniques.*
- *Ensure that the seat is properly secured before you start removing the actuator!*

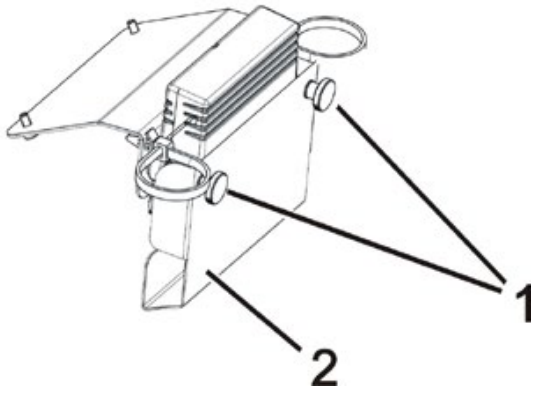
Requirements:

- retaining ring pliers
- oblique pliers
- cable binder

Note
Make a careful note of the seat settings. Mark the fitting positions, alignments, cable routing etc, and take photos with a digital camera if necessary.
Every change to the seat settings influences the centre of gravity of the mobility device. If the seat settings are changed, the stability lock system settings must be checked and readjusted if necessary as described in chapter 8.24.5.

- Run the lifter up to the top position if possible.
- If possible, tilt the seat with the tilt module as far as possible to the rear.
- Switch the controller off.

The actuator module for the lifter and the tilt actuators is fitted to the front edge of the seat support.



- Remove the two knurled screws (1) including washers.
- Remove the cover (2).
- Pull the plug out of the actuator module.
- Open the cable holder on the underside of the seat.
- Uncover the actuator cable so that you can pull it out of the lifter module later on together with the actuator.

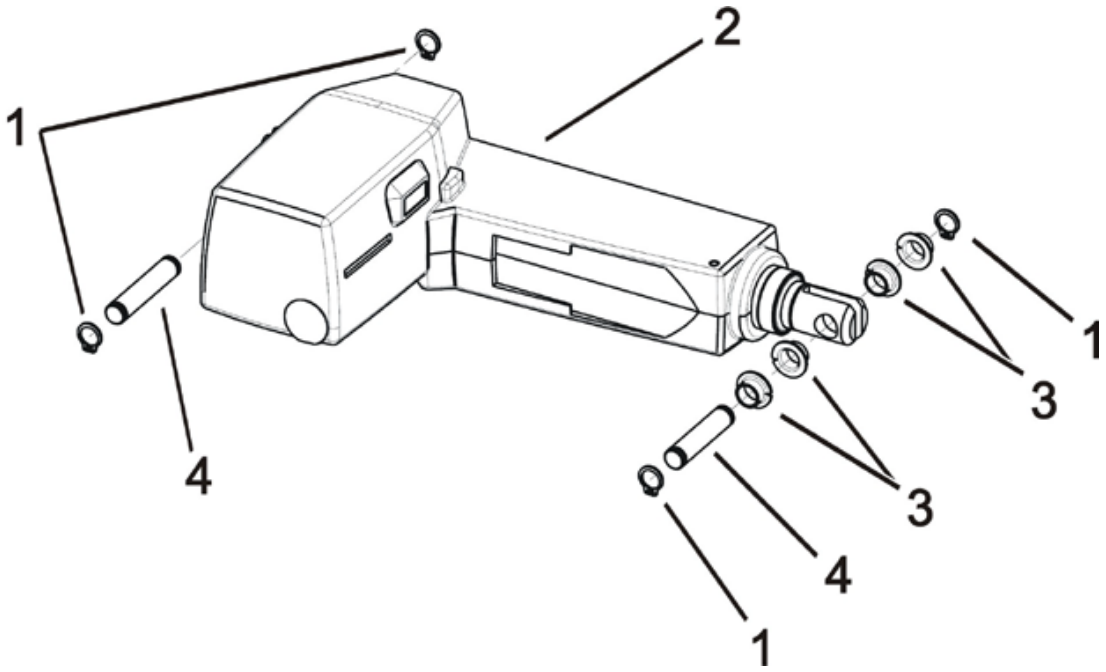
WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands if the seat is unintentionally folded down!

- *Use proper lifting techniques.*

- Ensure that the seat is properly secured against unintentional folding or falling down before you start removing the actuator.
  If you are unable to secure the seat, you must remove it completely.

If you are working on a combined lifter/tilt module, the lifter actuator is located in the lower section of the module.



- Remove the retaining ring (1) with the retaining ring pliers.
- Push the bolts (4) out of the guides. When removing the front bolts, take care with the bushes (3).
- Remove the actuator from the lifter module.

Refitting the lifter actuator:

- Refit all parts in the reverse sequence
- Carry out a performance test.

8.18.4.2 Method 2 - Removing the lifter actuator when the lifter is lowered

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

Requirements:

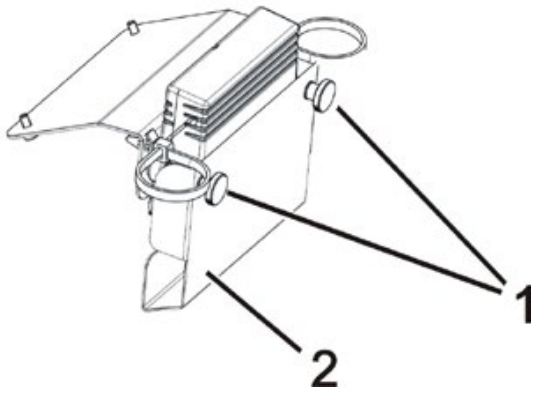
- retaining ring pliers
- oblique pliers
- cable binder
- long-nosed pliers, angled
- 6 mm Allen key

Note

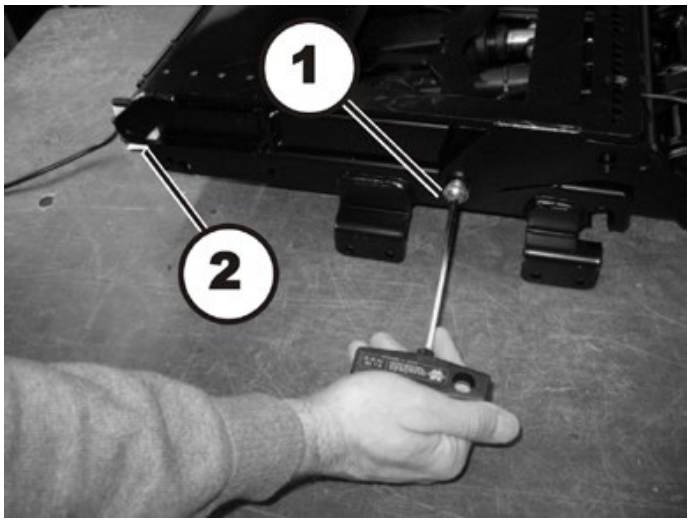
Make a careful note of the seat settings. Mark the fitting positions, alignments, cable routing etc, and take photos with a digital camera if necessary.
Every change to the seat settings influences the centre of gravity of the mobility device. If the seat settings are changed, the stability lock system settings must be checked and readjusted if necessary as described in chapter 8.24.5.

- Switch the controller off.

The actuator module for the lifter and the tilt actuators is fitted to the front edge of the seat support.



- Remove the two knurled screws (1) including washers.
- Remove the cover (2).
- Pull the plug out of the actuator module.
- Open the cable holder on the underside of the seat.
- Uncover all the actuator cables so that you can remove the seat.



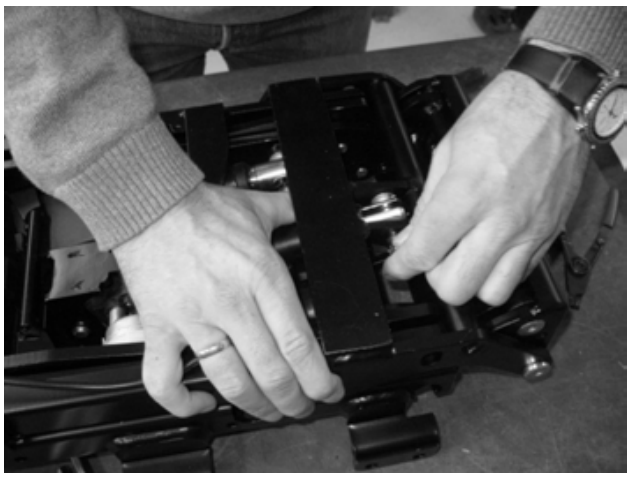
- Undo and remove the seat support Allen screws (1) on the left-hand and right-hand side of the mobility device.

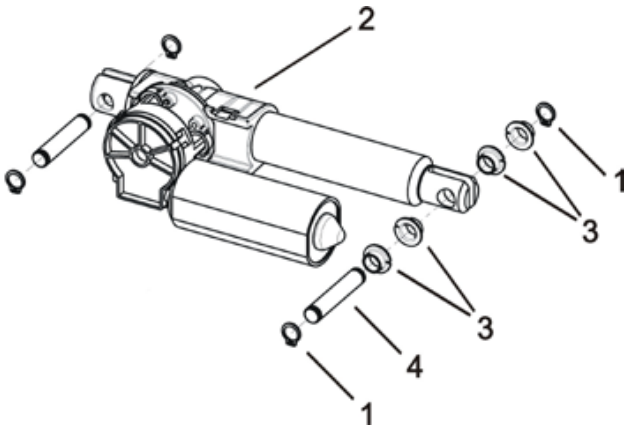
WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

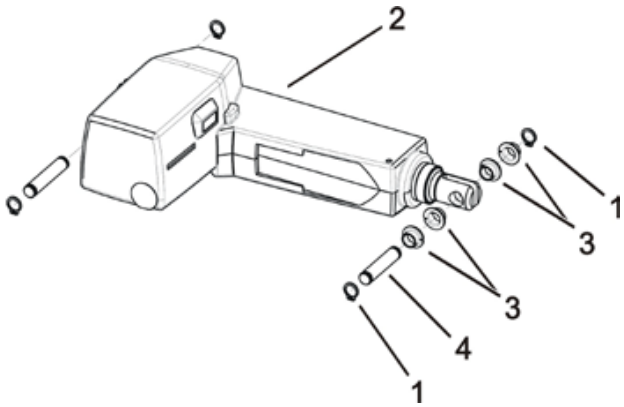
- Tilt the seat to the rear and push the rear holders (2) out of their guides.
- Remove the seat.

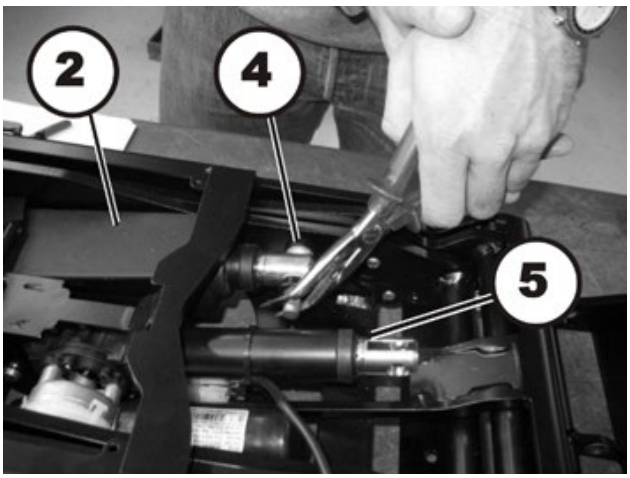




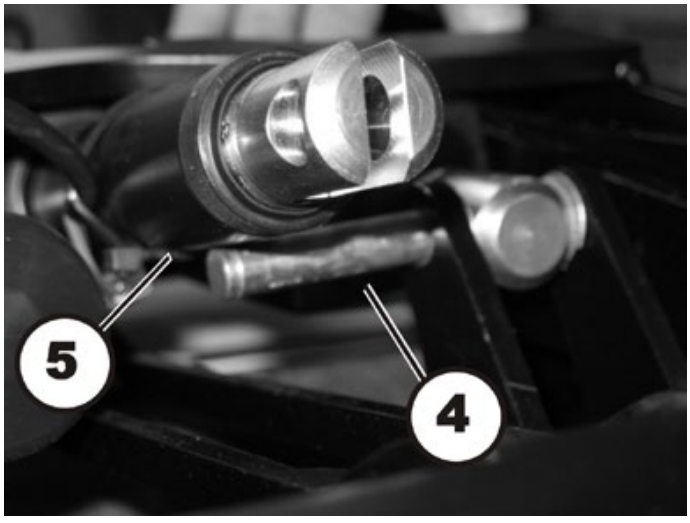
- Remove the retaining ring (1) with the retaining ring pliers.
- Push the bolts (4) out of the guide. Take care with the bushes (3).

- Fold the tilt lever (1) forwards.

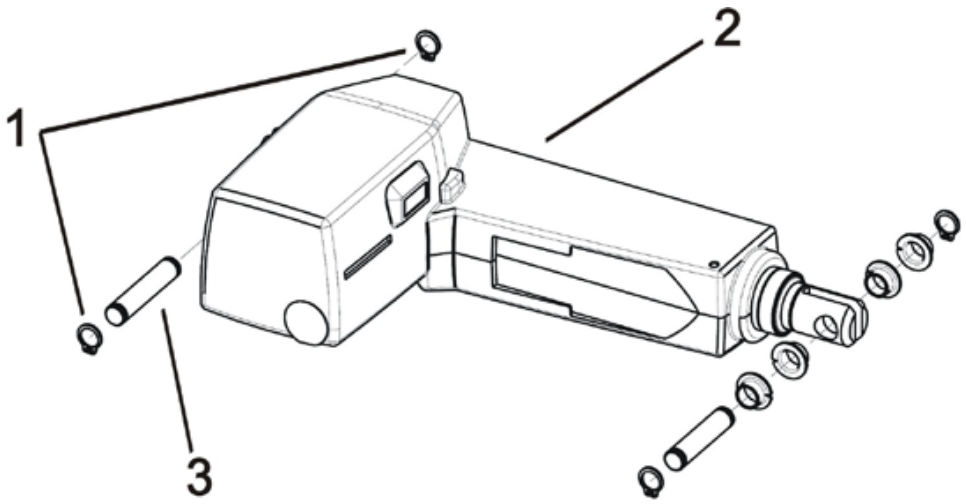




- Remove the retaining ring (1) on the front bolts (4) on the lifter actuator (2) using the retaining ring pliers.
- Pull the bolts out of the guide using the angled long-nosed pliers until the bolt is almost contacting the tilt actuator ((5). Take care with the bushes (3).



- Lift the tilt actuator ((5) slightly.
- Pull the lifter actuator bolts (4) under the tilt actuator and out of the guide.



- Remove the retaining ring (1) on the rear bolts (3) on the lifter actuator (2) using the retaining ring pliers.
- Push the bolts out of the guides.
- Remove the actuator from the lifter module.

Refitting the lifter actuator:

- Refit all parts in the reverse sequence
- Carry out a performance test.

8.18.5 Seat support

Note
This chapter deals with replacing the seat support for a seat without lifter or tilt modules. Please proceed as described in chapter 8.18 to replace lifter or tilt modules.

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

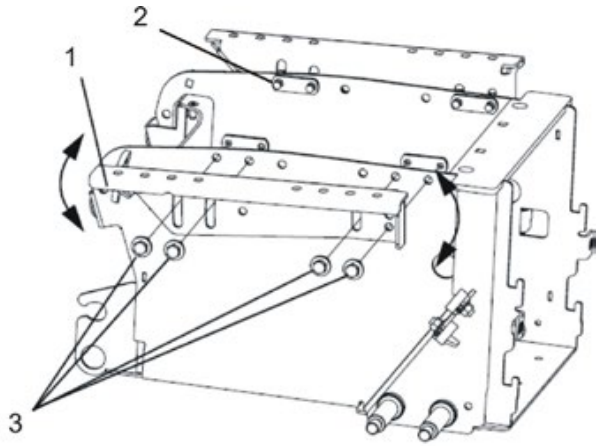
Requirements:

- Phillips screwdriver size 2
- 5/16“ socket spanner
- 5/8“ Allen key
- torque wrench 5 - 25 Nm (or similar)
- protractor

Note
Make sure you have noted the seat settings. Mark the fitting positions, alignment etc. If necessary, take photos with a digital camera.
Any changes to the seat settings influence the centre of gravity of the wheelchair. If changes are made to the seat settings, the stability lock system settings must be checked and readjusted if necessary, as described in chapter 8.24.5.

Dismantling the seat support:

- Remove the seat. Use proper lifting techniques.
- Remove the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.



- Undo the bolt (3) with a 5/16" socket spanner.
- Hold the seat support (1) firmly while you remove the bolts (3) and the metal plates (2).

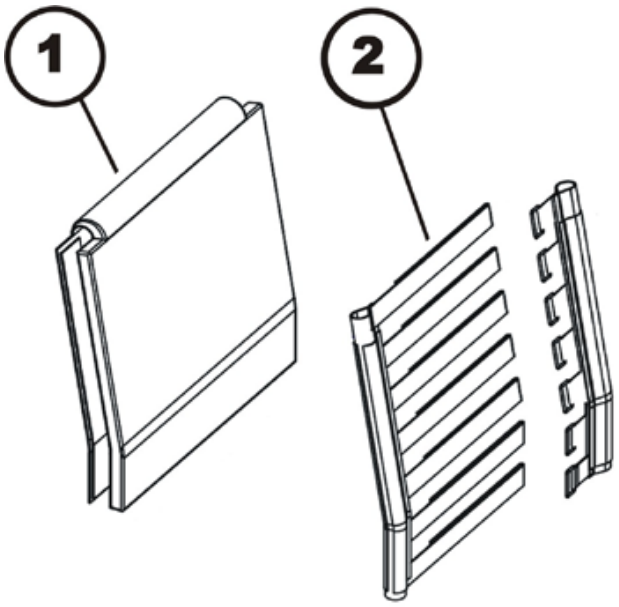
Refitting the seat carrier:

- Hold the seat support (1) firmly while you fit the bolts (3) and the metal plates (2).
- Screw the bolts in but do not tighten them.
- Use the protractor to adjust the seat carrier to the required angle.
- Tighten the bolts to 18 Nm.
- Refit the batteries including battery carrier as described in chapters 8.5.2/8.5.3 and 8.5.1.
- Refit the seat.
- Adjust the stability lock system as described in chapter 8.24.5.

8.19 Backrest Unit

8.19.1 Adjusting backrest former

The backrest former can be individually adapted to the user's back shape.



- Pull the front and rear faces of the backrest upholstery (1) apart and remove. The backrest upholstery front and rear faces are held together using Velcro fastenings.
- Open the backrest belt (2) Velcro fastenings and adjust to the required length.
- Reattach the backrest upholstery and fix with Velcro fastenings.

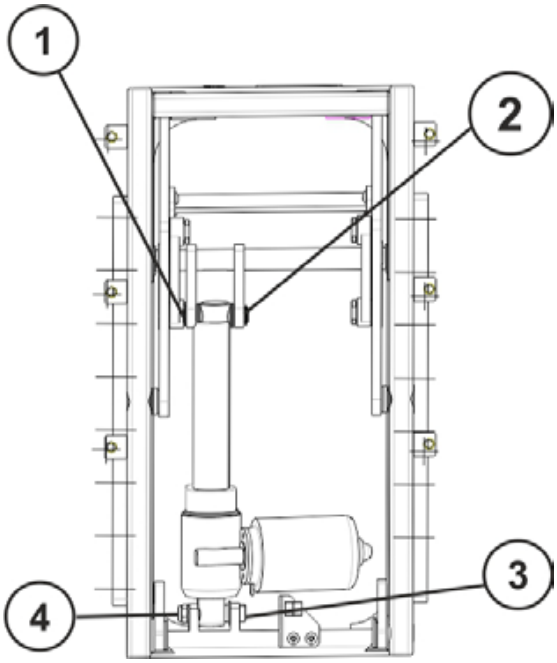
8.20 Seat system Modulite

8.20.1 Replacing the tilt actuator

Note
Replacing the actuator for the seat angle adjustment in the lifter / seat tilt adjustment module is also described.

Requirements:
- Screwdriver, flat, width 6 mm
- 13 mm jaw spanner (2x)
- Slotted screwdriver

- Remove legrests.
- Switch the electronics OFF on the remote.
- Disconnect the actuator cable from the cable harness



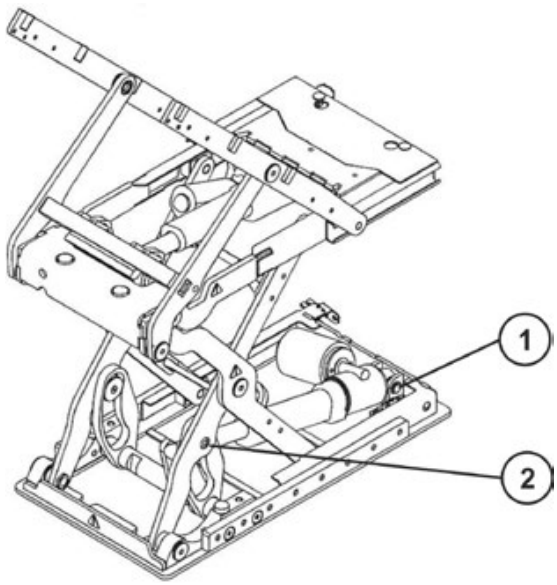
Variant actuator - tilt:
- Bottom fixing bolt (3) with nut (4) –
  Loose the nut with the open-ended wrenches.
  Remove the nut and bolt.
- Top fixing bolt (2) secured with snap rings (1) –
  Remove a snap ring using a screwdriver and remove the bolt.
- Pull the actuator out.
- Insert a new actuator.
- Reassembly takes place in the reverse order.
- Connect the actuator cable to the cable harness.
- To complete, check all seat tilting function

Variant seat angle adjustment actuator in the lifter/seat angle adjustment module:
- Bottom fixing bolt (3) with slot –
  Loosen the fixing bolt with a screwdriver.
  Remove the bolt.
- Top fixing bolt (2) secured with snap rings (1) –
  Remove a snap ring using a screwdriver and remove the bolt.
- Pull the actuator out.
- Insert a new actuator.
- Reassembly takes place in the reverse order.
- Connect the actuator cable to the cable harness.
- To complete, check all seat tilting function.

8.20.2 Replacing the lifter actuator

Requirements:
- Screwdriver flat, width 6 mm
- Large screwdriver
- Flat screwdriver

- Remove legrests.
- Run the lifter up to if possible.
- Switch the electronics OFF on the remote.
- Secure the seat.
- Pull the plug from the actuator.
- Bottom fixing bolt (2) secured with snap rings – Remove a snap ring using a screwdriver and remove the bolt.
- Top fixing bolt (3) with slot – Loosen the fixing bolt with a screwdriver. Remove the bolt.
- Replace actuator.
- Reassembly of the actuator takes place in the reverse order.
- Connect the plug of the actuator cable to the actuator.
- To complete, check all seat tilting function.



If the lifter cannot be raised, a cover can be removed from the upper rear side of the module. This way it is possible to reach the lower fixation bolt of the actuator.

8.20.3 Replacing the lifter / seat angle adjustment module

Note
Replacement of the seat angle adjustment module is performed in the same manner.

ATTENTION: Danger of crushing!
The seat is very heavy. Danger of injury to hands and feet!
· *Use proper lifting techniques*

Requirements:
- 3 mm Allen key
- 10 mm open spanner
- T25 Torx wrench
- T40 Torx wrench
- Side cutting pliers
- Cable ties

· Remove legrests.

· Tilt the seat tilting completely to the rear if possible.

· Switch the electronics OFF on the remote.

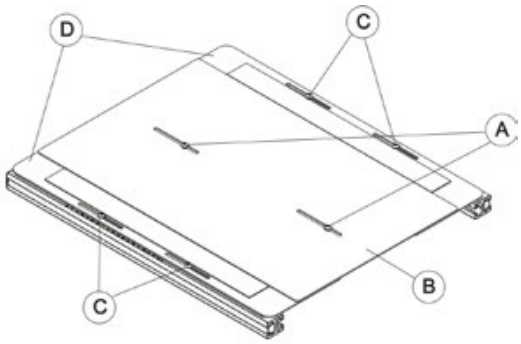
· Remove the backrest cushion.

· Loosen and remove the screws, which secure the middle seat plate (A) with a 3 mm Allen key.

· Remove the middle seat plate (B).

· Loosen and remove the screws on both sides, which secure the lateral seat plates (C) with a 3 mm Allen key.

· Remove the lateral seat plates (D).

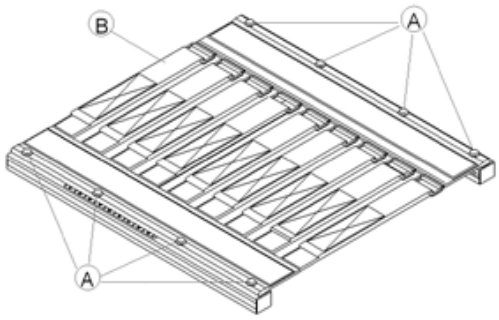


or

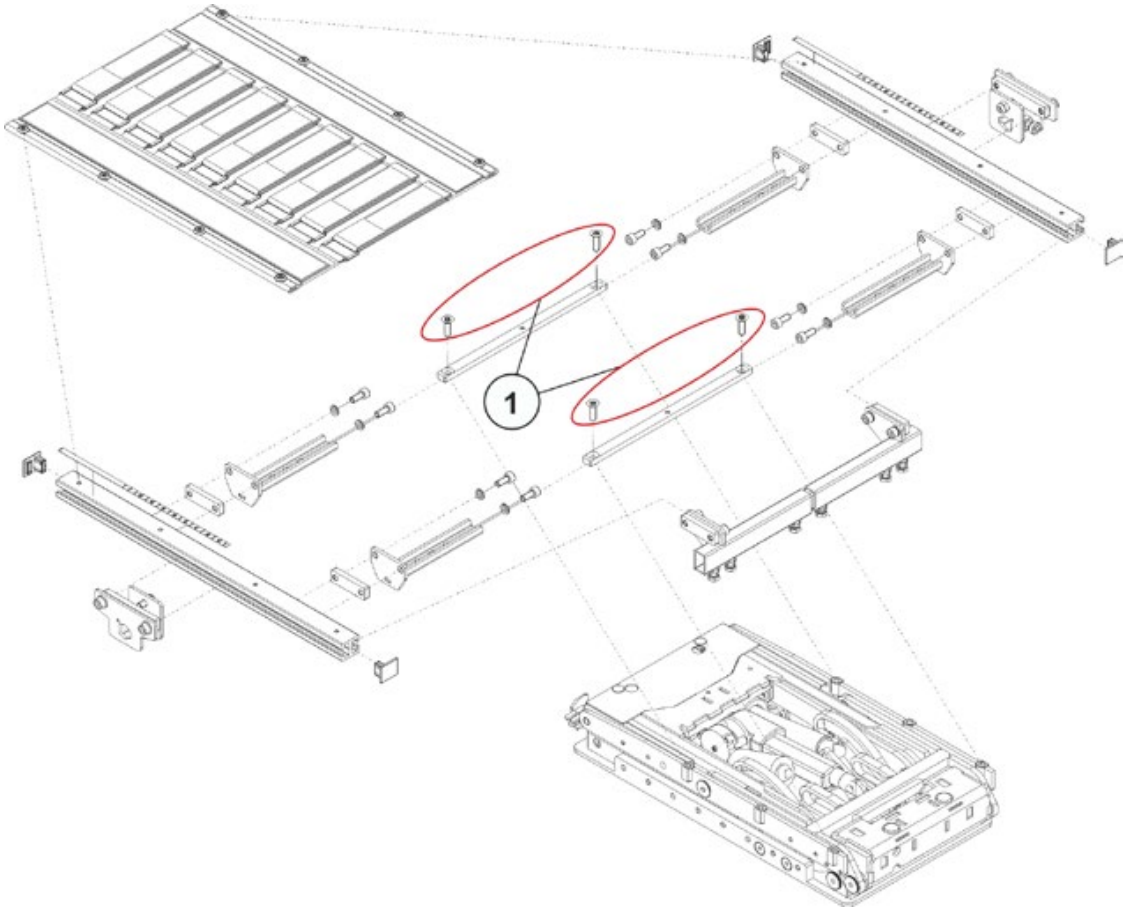
· Remove the seat cushion.

· Loosen and remove the screws on both sides, which secure the sling seat (A) with a T25 Torx wrench.

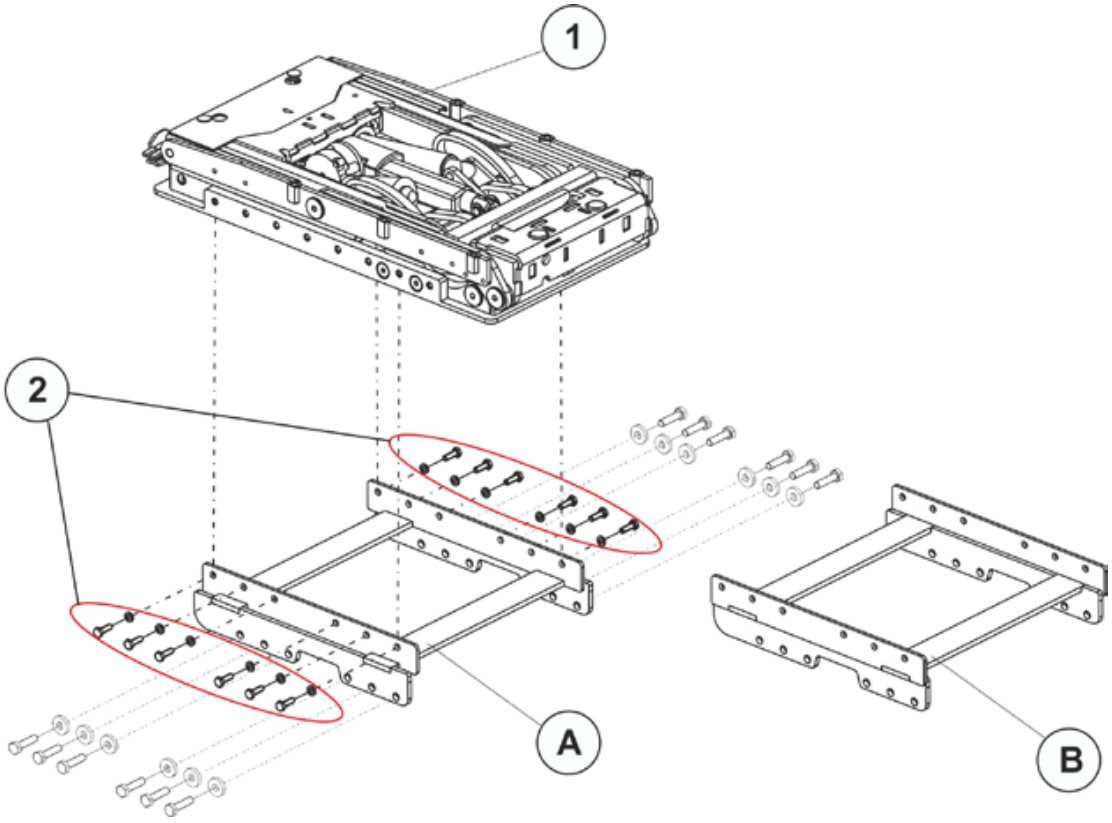
· Remove the sling seat (B).



- Remove the seat frame by removing the screws (1) with a T40 Torx wrench.



- Disconnect the actuator cable and microswitch cable from the cable harness.



- Loosen and remove the screws (2) incl. the washers with a 10 mm open spanner.
- Lift the module of the seat angle adjustment (1) from the adapter (A) or (B) and replace it:
  Depending on the chassis type:

Adapter (A) -	Chassis	TDX SP / TDXSP2	(total width of 650 mm)
Adapter (B) -	Chassis	TDX SP^{NB}	(total width of 620 mm)
	Chassis	TDX SP2^{NB}	(total width of 610 mm)

- Reassembly takes place in the reverse order.

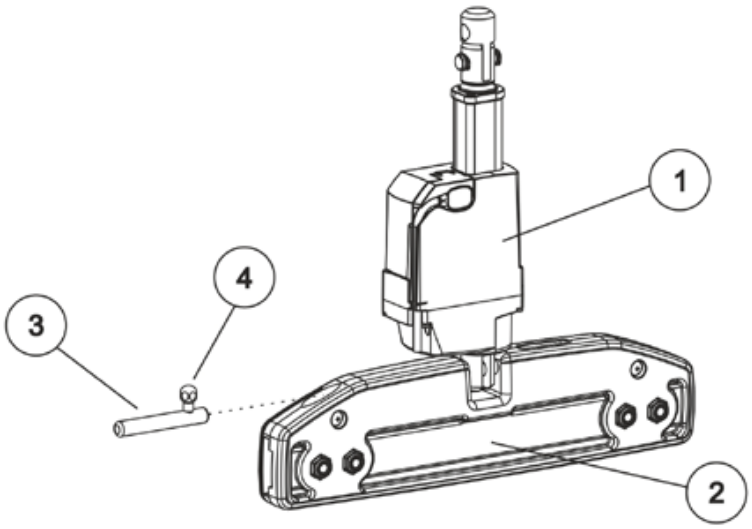
Note
Make sure that all screws, washers and nuts are reassembled in the correct order and securely tightened during assembly.

- When installing the seat, pay attention to its heavy weight!
- To complete, check all seat tilting function.

8.20.4 Replacing the backrest actuator

Dismantling the backrest actuator:

- Pull the cable off directly where it is connected to the actuator (1)
- Detach the bracket of the actuator at the top and bottom; to do this, slide the bolts (3) to the side using the lever (4) and tilt the actuator (1) out of the backrest clamp (2).
- Replace actuator.



Refitting the backrest actuator:

- Assemble the parts in the reverse order.

8.20.5 Replacing the seat support (without lifter or tilt modules)

Note
This chapter deals with replacing the seat support for a seat without lifter or tilt modules. Please proceed as described in chapter 8.20.3 to replace lifter or tilt modules.

WARNING: Danger of crushing!

The seat is very heavy. Injury hazard to hands and feet!

- *Pay attention to the hand and feet*
- *Use proper lifting techniques*

Requirements:

- 3 mm Allen key
- 10 mm open spanner
- T25 Torx wrench
- T40 Torx wrench
- Side cutting pliers
- Cable ties

· Remove legrests.

· Switch the electronics OFF on the remote.

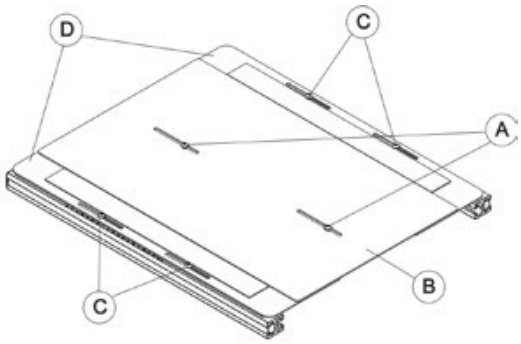
· Remove the backrest cushion.

· Loosen and remove the screws, which secure the middle seat plate (A) with a 3 mm Allen key.

· Remove the middle seat plate (B).

· Loosen and remove the screws on both sides, which secure the lateral seat plates (C) with a 3 mm Allen key.

· Remove the lateral seat plates (D).

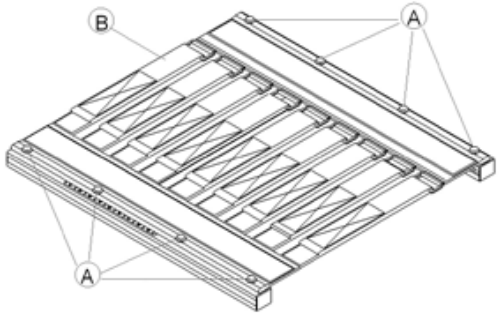


or

· Remove the seat cushion.

· Loosen and remove the screws on both sides, which secure the sling seat (A) with a T25 Torx wrench.

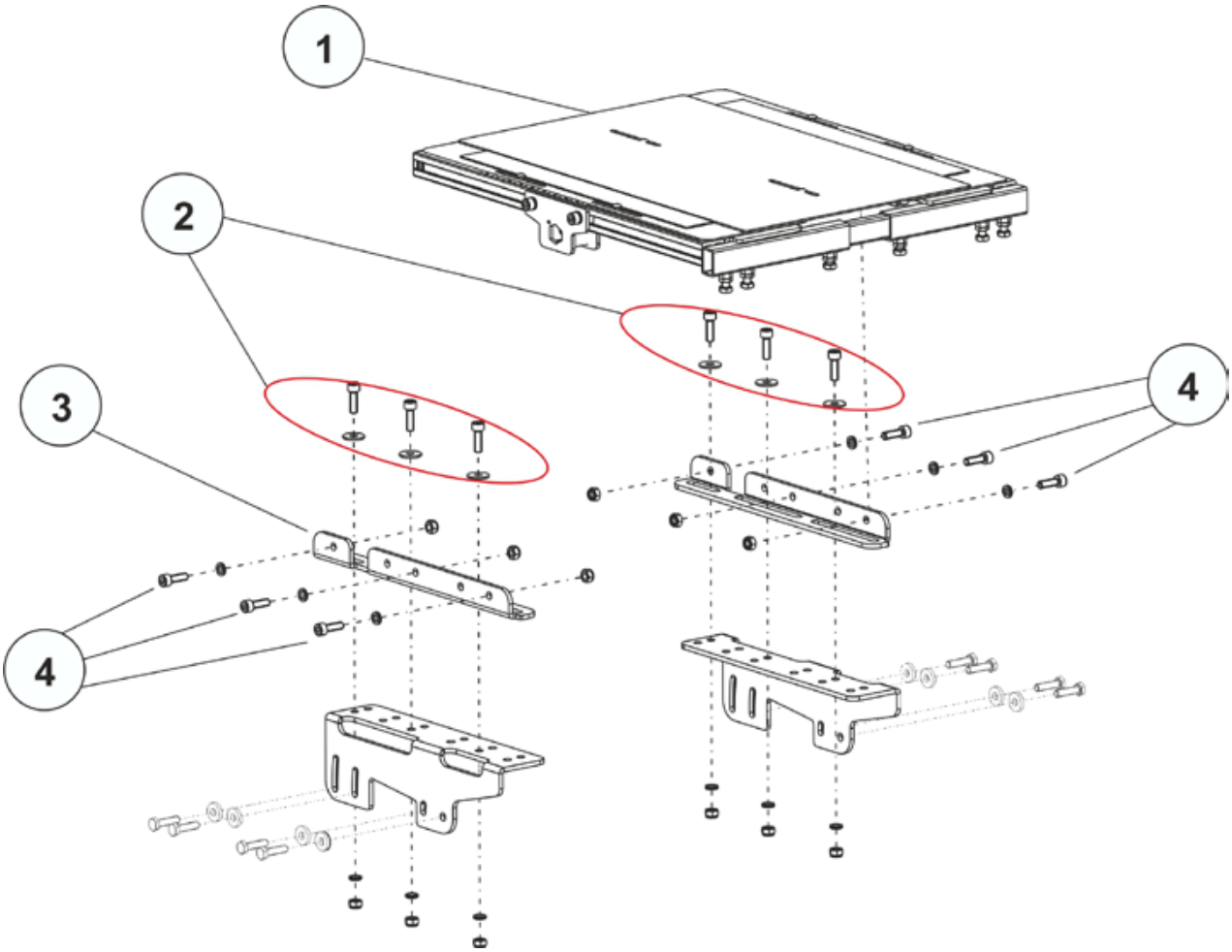
· Remove the sling seat (B).



Uninstalling the seat support (adjustable seat / simple seat)

Requirements:
- 6 mm Allen key
- 13 mm ring spanner or jaw spanner

The following figure shows the seat support with the adjustable seat plate.



- Loosen and remove the screws (2) incl. washers and nuts with a 6 mm Allen key and a 13 mm jaw spanner.
- Pull the seat frame (1) up and off.
- Loosen and remove the screws (4) incl. washers and nuts with a 6 mm Allen key and a 13 mm jaw spanner.
- Remove the seat adapter (3).

The dismantling of the seat support on the chassis is described in chapter 8.18.5.

Installing the seat and seat support

- Assemble all parts in reverse order.

Note
Make sure that all screws, washers and nuts are reassembled in the correct order and securely tightened during assembly.

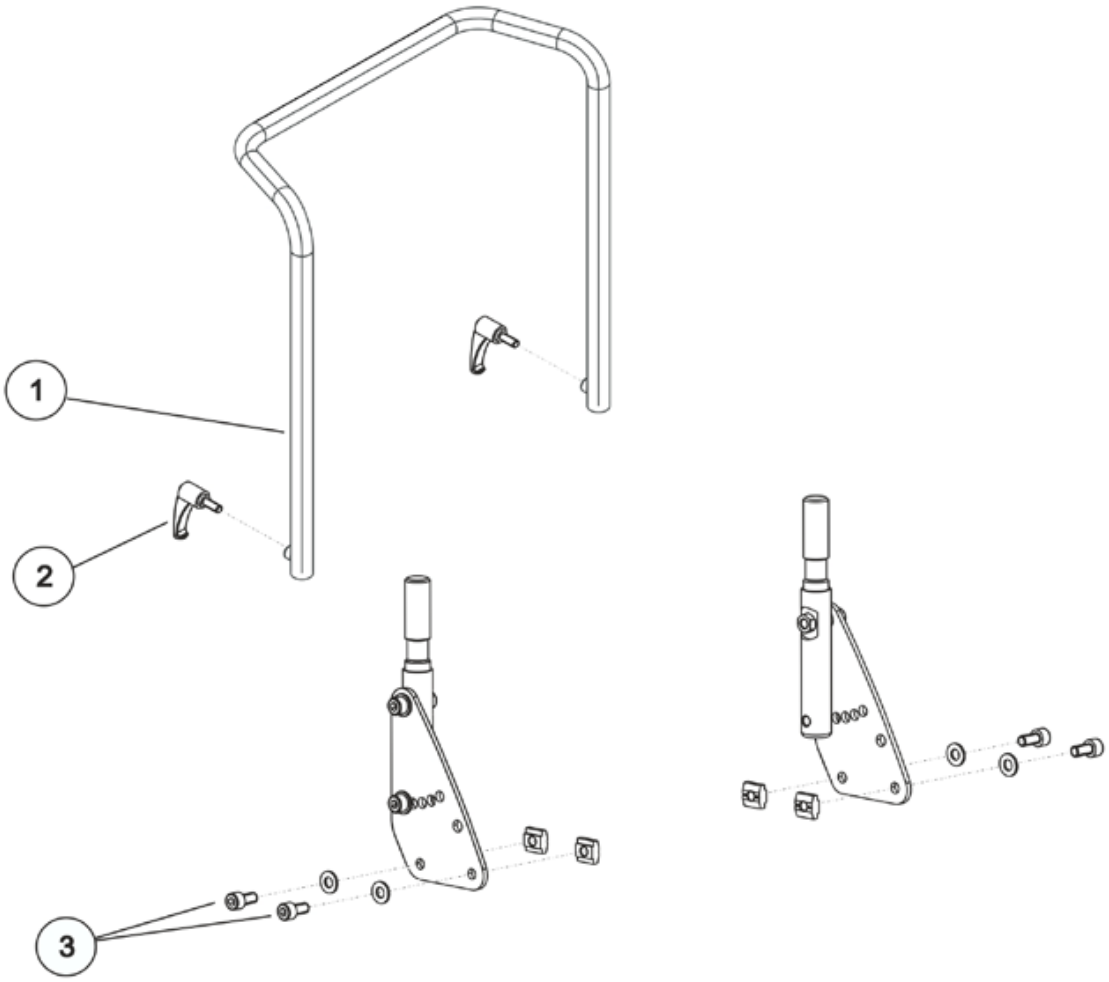
- When installing the seat, pay attention to its heavy weight!
- Tighten the screws to a torque of 25 Nm.
- Check all functions of the vehicle and go for a test drive.

8.21 Backrest Modulite

8.21.1 Replacing the standard backrest

Requirements:
- 5 mm Allen key

Dismantling the backrest unit:
- Remove the backrest cushion.
- Loosen the fixation lever (2) of the backrest tube.
- Remove the backrest tube.



- Use the Allen key to loosen and remove the hexagon socket head screws (3) including the nuts and washers on the left and right side of the chair.

Refitting the backrest unit:
- Replace the parts in the reverse order.
- To conclude, you should always carry out a trial run to test the vehicle functions.

8.21.2 Replacing the backrest mounting bracket

Requirements:
- 5 mm Allen key

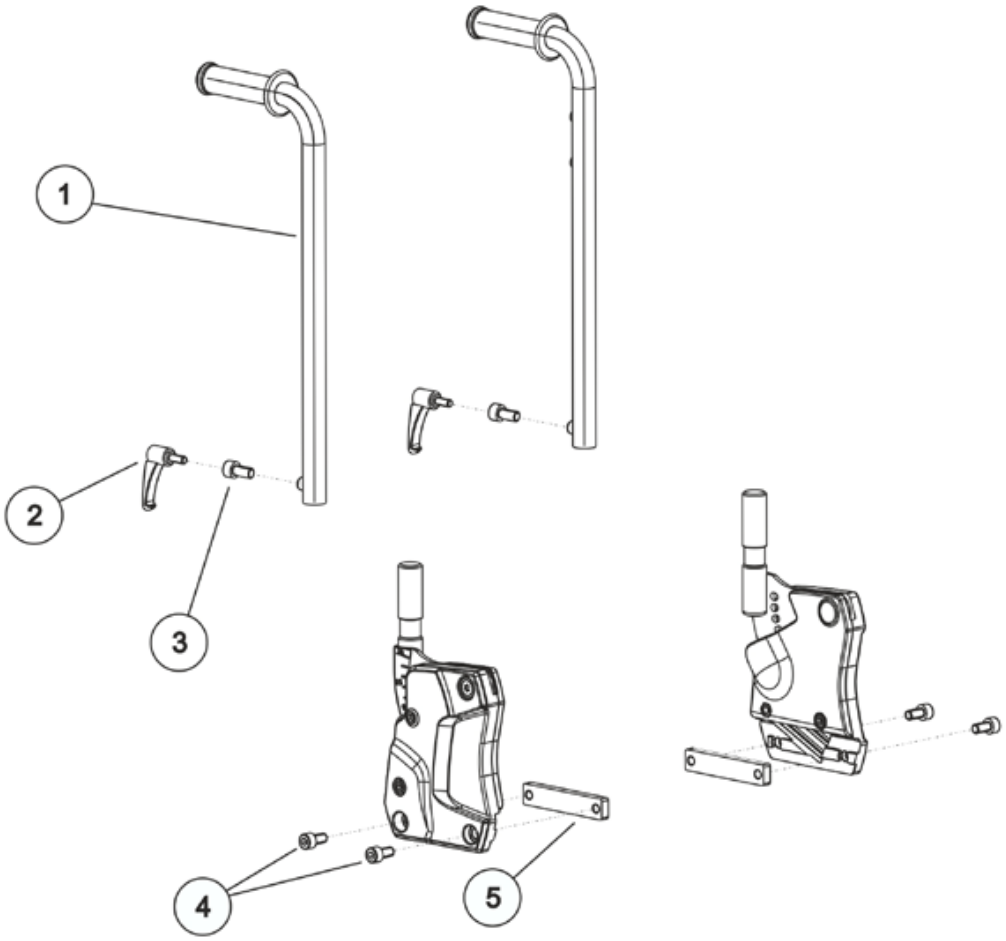
Dismantling the backrest unit:

- Remove the backrest cushion.
- Loosen the fixation levers (2) of the corresponding backrest tube (1), depending on the version.

  There are two versions:

  (2) - for the manual backrest

  (3) - for the electrically adjustable backrest
- Remove the backrest tube.



- Loosen and remove the two hexagon socket head screws (4) to the sliding block (5) on the left and right side of the chair.

Refitting the backrest unit:

- Replace the parts in the reverse order.
- To conclude, you should always carry out a trial run to test the vehicle functions.

8.21.3 Replacing the backrest mounting bracket for SB 53

Requirements:
- 5 mm Allen key

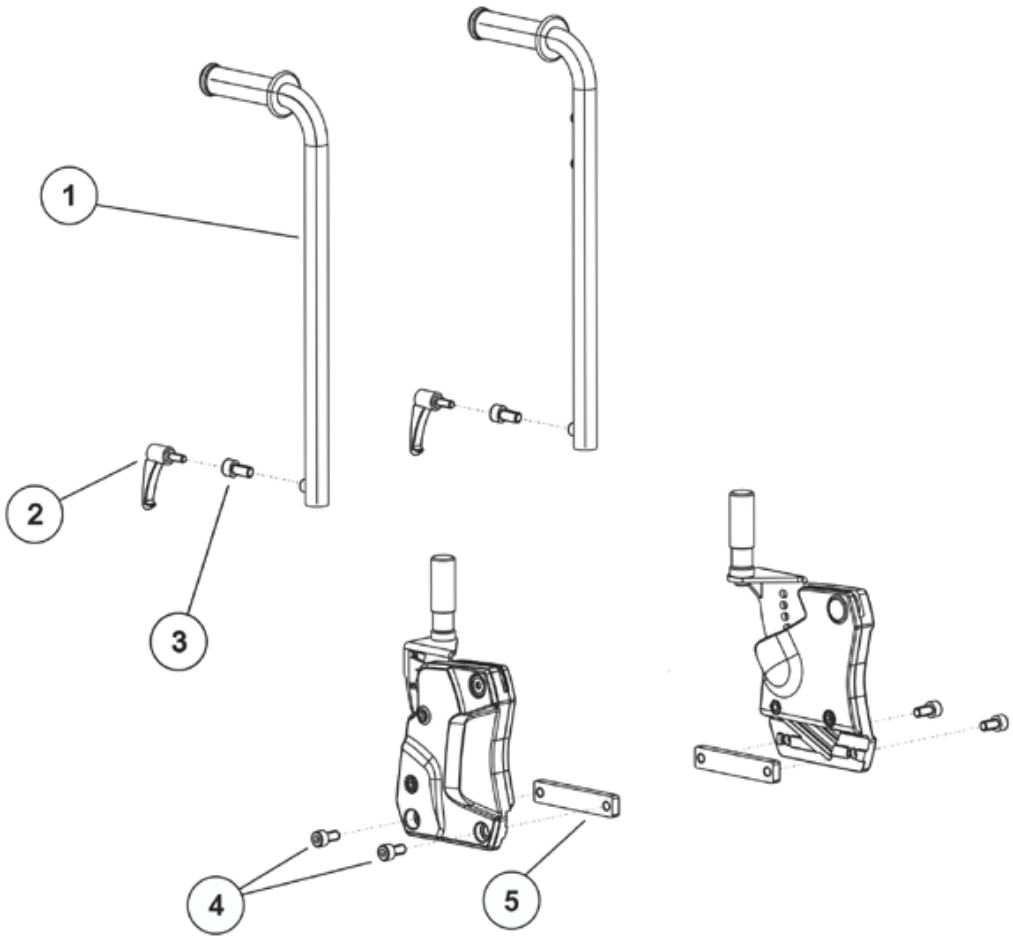
Dismantling the backrest unit:

- Remove the backrest cushion.
- Loosen the fixation levers (2) of the corresponding backrest tube (1), depending on the version.

  There are two versions:

  (2) - for the manual backrest

  (3) - for the electrically adjustable backrest
- Remove the backrest tube.



- Loosen and remove the two hexagon socket head screws (4) to the sliding block (5) on the left and right side of the chair.

Refitting the backrest unit:

- Replace the parts in the reverse order.
- To conclude, you should always carry out a trial run to test the vehicle functions.

8.22 Adjusting the seat width/ backrest width (Modulite)

8.22.1 Adjusting the seat width

You can only adjust the seat width for the adjustable seat plate or for the adjustable sling seat.

The sling seat is available in two widths:
- for a seat width of 38-43 cm and
- for a seat width of 48-53 cm.

When modifying the seat width, the backrest width must also be correspondingly adapted. See chapter 8.22.2.

Requirements:
- 3 mm Allen key
- 5 mm Allen key
- 13 mm open-ended spanner
- T25 Torx wrench
- T40 Torx wrench

· Remove the backrest cushion.

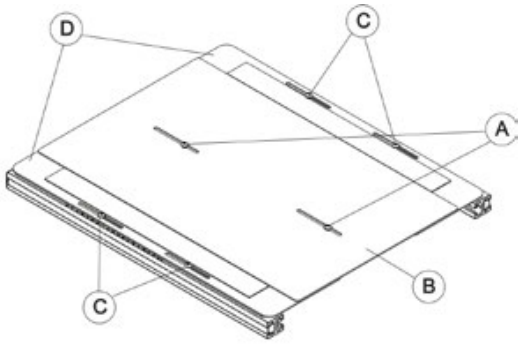
· Remove the backrest from the backrest mounting bracket.
See chapter 8.21.

· Loosen and remove the screws, which secure the middle seat plate (A) with a 3 mm Allen key.

· Remove the middle seat plate (B).

· Loosen and remove the screws on both sides, which secure the lateral seat plates (C) with a 3 mm Allen key.

· Remove the lateral seat plates (D).

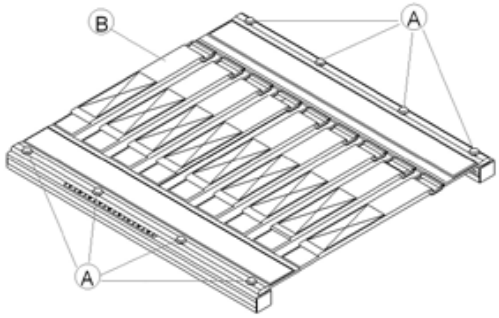


or

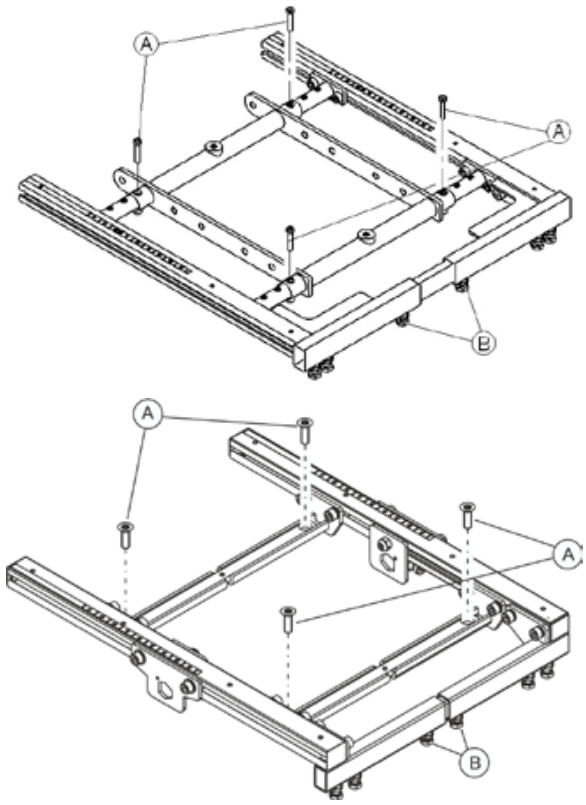
· Remove the seat cushion.

· Loosen and remove the screws on both sides, which secure the sling seat (A) with a T25 Torx wrench.

· Remove the sling seat (B).



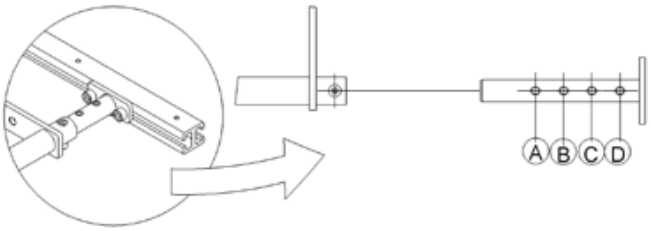
- Loosen and remove the screws of the seat frame adjustment (A) with a T40 Torx wrench.
- Loosen and remove the screws of the fixation of the legrest mounting brackets (B).



- Adjust the seat frame and the legrest fixation to the desired width according to the following illustrations and tables:

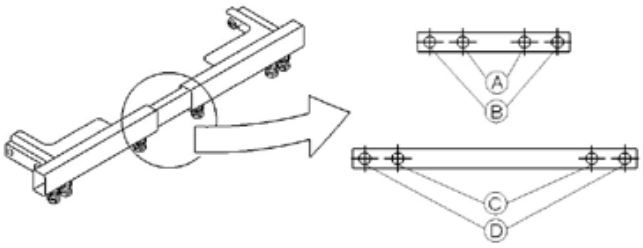
Seat frame:

Screw position	Seat width
A	530 mm
B	480 mm
C	430 mm
D	380 mm



Leg supports connection:

Screw position	Seat width
A	380 mm
B	430 mm
C	480 mm
D	530 mm
Note When switching from 430 mm to 480 mm and the other way around, the fixation of the legrests must be replaced.	



- Reposition the screws and tighten them again.
- Install the seat plate or the sling seat.
- Reposition the seat cushion.

8.22.2 Adjusting the backrest width

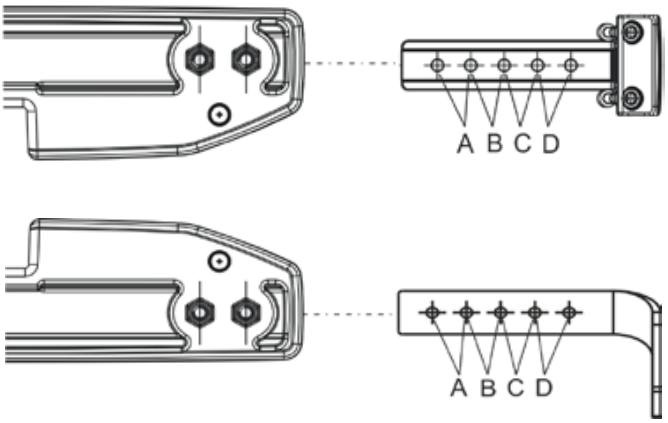
The backrest width is adjusted by performing the following tasks:

- Adjust the backrest tube.
- Adjust the backrest:
  - Sling backrest, as described in chapter 8.19.1**.**
  - Flex3 backrest, as described in chapter 8.22.3.
- Replace the backrest cushion (these are available in various widths).

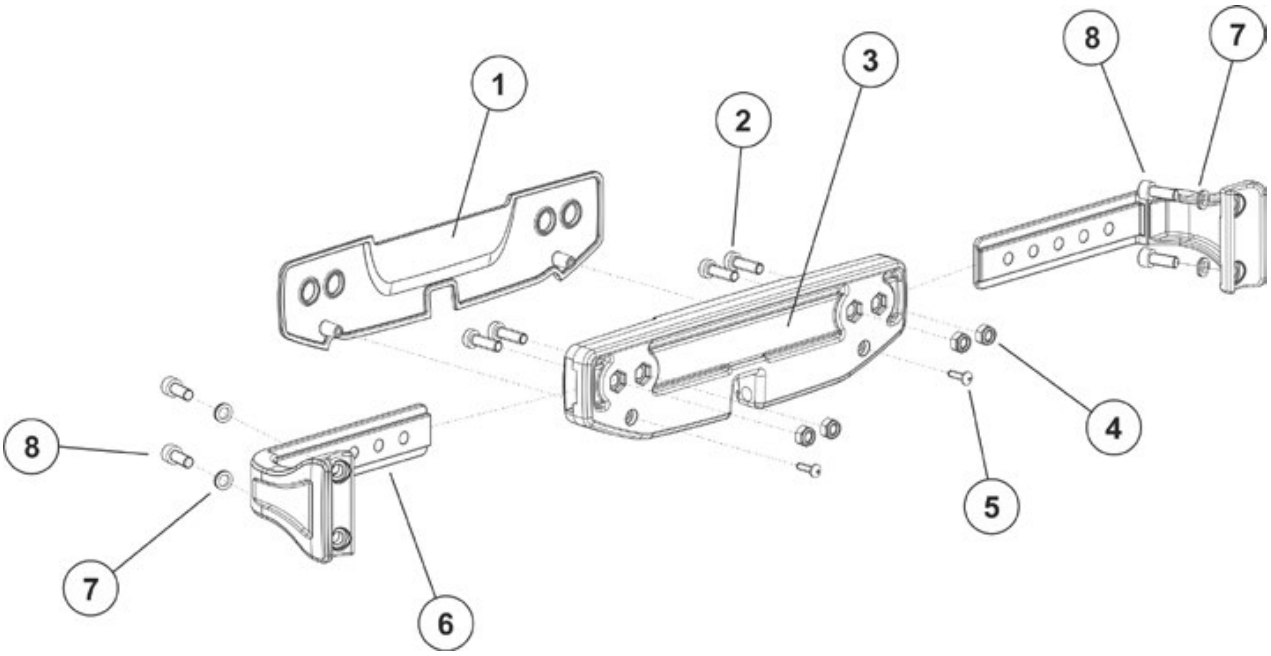
When modifying the backrest width, the seat width must also be correspondingly adapted. Please see chapter 8.22.1.

Requirements:
- 3 mm Allen key
- 5 mm Allen key
- 13 mm Open-ended spanner

The screw position for the backrest width, refer to the table:



Screw position	Seat width
A	530 mm
B	480 mm
C	430 mm
D	380 mm

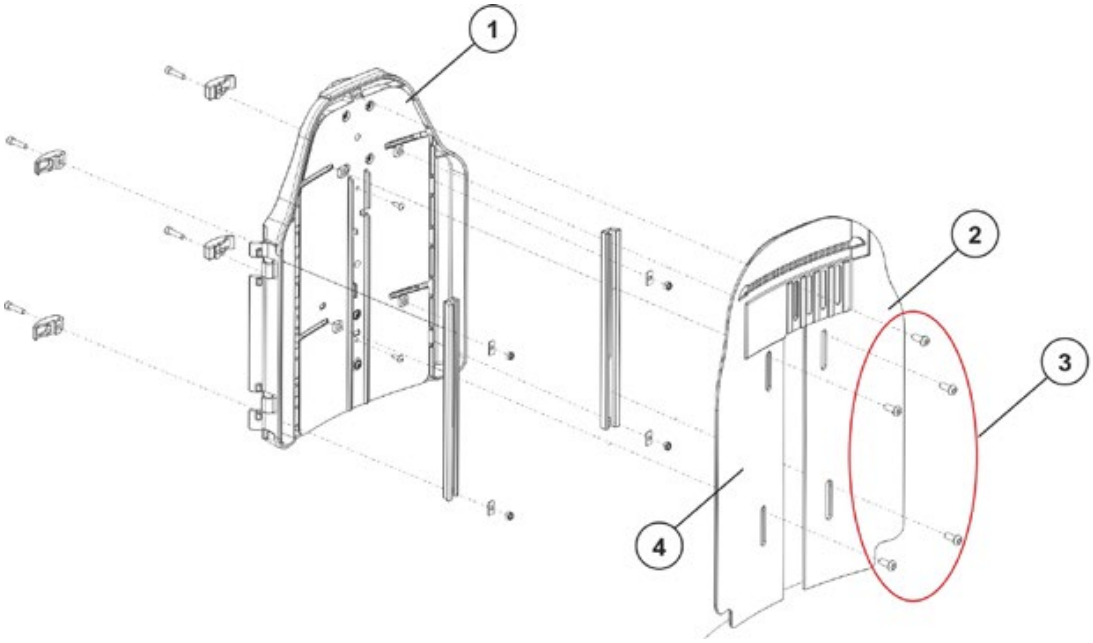


- Remove the backrest cushion.
- Loosen the straps of the sling backrest or remove the Flex3 backrest.
- Loosen and remove both screws (5) of the actuator fixation bracket.
- Remove the cover of the actuator fixation bracket.
- Loosen and remove the screws and nuts (2, 4) on the upper and lower actuator fixation bracket on both sides.
- Adjust the backrest fixation (6) for the new backrest width according to the table on page 173.
- Insert the screws (2) through the cover of the actuator fixation bracket and the corresponding holes of the backrest fixation to the actuator fixation.
- Fasten these with the nuts (4).
- Reposition the cover of the actuator fixation bracket.
- Insert and tighten the screws (5) again.
- Adjust the straps of the sling backrest to the new width or install the adjusted Flex 3 backrest.
- Install the backrest cushion.
- Perform a function check of the chair.

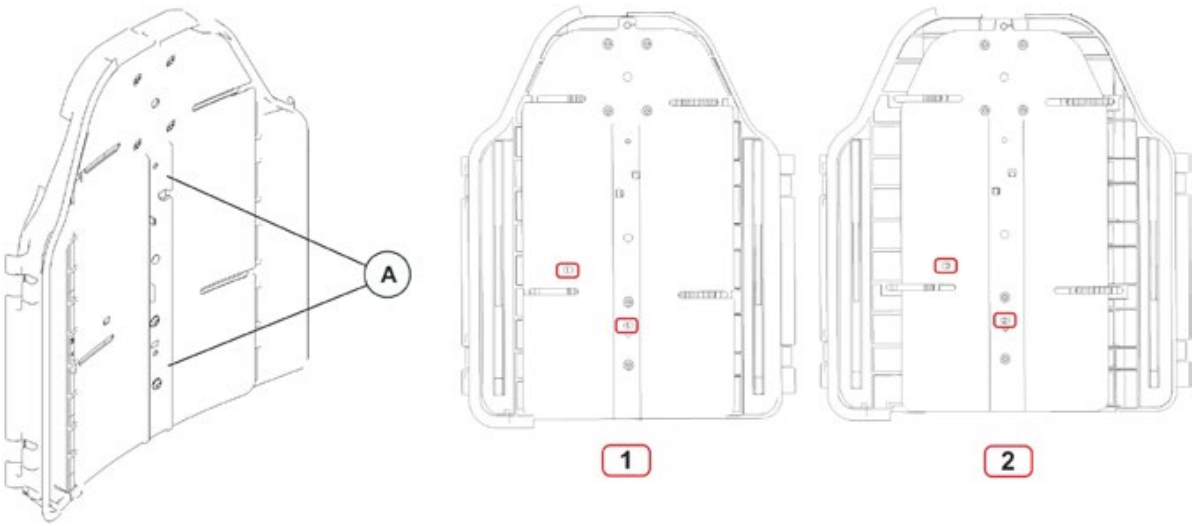
8.22.3 Adjusting the Flex3 backrest

Requirements:
- Phillips screwdriver
- 5 mm Allen key

- Remove the front lateral plates (2 and 4) from the backrest (1) by loosening and removing the five hexagon socket head screws (3).



- Remove both Phillips screws (A) on the middle plate.



- Shift the position of the rear plate halves (three settings are possible using the drill holes).
  - **Before** pulling the Flex3 backrest apart, a "1" will be visible in the small, rectangular cut-out.
  - **After** pulling the Flex3 backrest apart, a "2" will be visible in the small, rectangular cut-out.
- Re-insert the two screws (A) into the middle plate.
- Fasten the front lateral plates (2 and 4) again.

8.23 Centre-mounted legrest (electric & manual)

8.23.1 Replacing the manually operated centre-mounted legrest

WARNING: Danger of crushing!

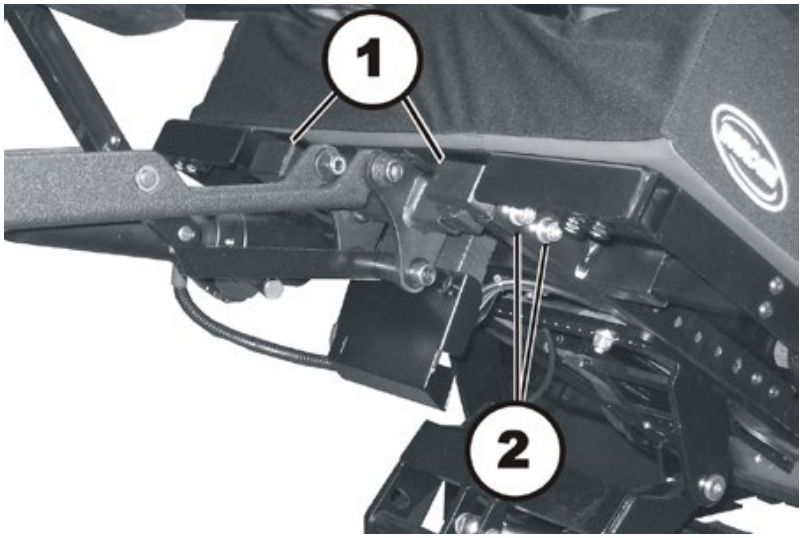
The legrest is very heavy. Danger of injury to hands and feet!

· *Pay attention to the heavy weight.*

Requirements:

- 5 mm Allen key
- 6 mm Allen key
- Side cutting pliers
- Cable ties

Uninstalling the manually operated centre-mounted legrest:



An electric legrest can be seen in the illustration. The method of fixation to the seat is identical with both legrests.

- Uninstall the locking lever for the height adjustment of the legrest, by loosening the grub screws with a 5 mm Allen key.
- Use the 6 mm Allen key to loosen and remove the two hexagon socket head screws (2) on both sides of the wheelchair.
- Completely remove both hexagon socket head screws, including the washers.
- Pull the entire legrest forwards out of the seat.
- Loosen both hexagon socket head screws, which attach the adapter brackets (1) to the legrest.
- Remove both adapter brackets.

Installing the manually operated centre-mounted legrest:

- Assemble the parts in reverse order.
- Test all functions of the wheelchair.

8.23.2 Replacing the electrically operated centre-mounted legrest

WARNING: Danger of crushing!

The legrest is very heavy. Danger of injury to hands and feet!

· Pay attention to the heavy weight.

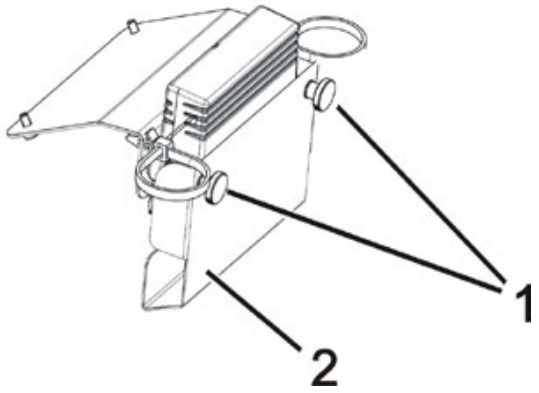
Requirements:

- 6 mm Allen key
- Side cutting pliers
- Cable ties

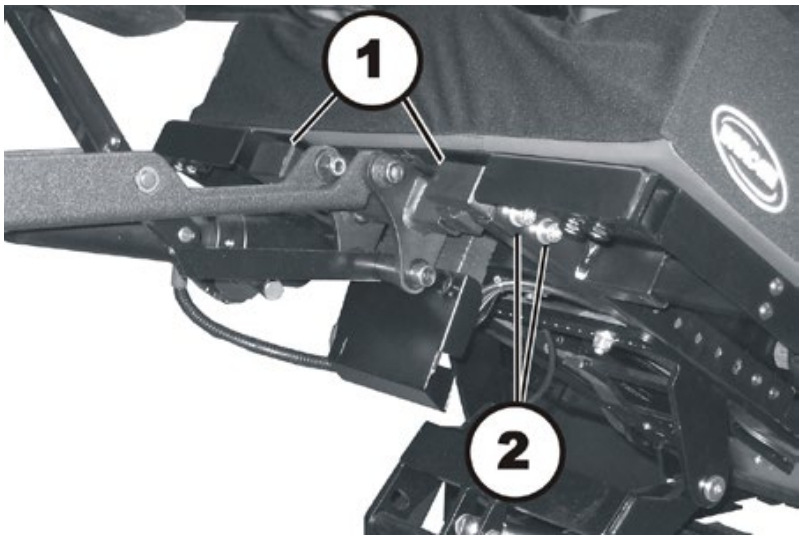
Uninstalling the electrically operated centre-mounted legrest:

- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.

The actuator module for the lifter and the tilt actuator are mounted to the front edge of the seat frame.



- Completely remove both knurled head screws (1) including the washers.
- Remove the cover (2).
- Pull the plug of the legrest actuator out of the actuator module.



- Use the 6 mm Allen key to loosen and remove the two hexagon socket head screws (2) on both sides of the wheelchair.
- Completely remove both hexagon socket head screws, including the washers.
- Pull the entire legrest forwards out of the seat.
- Loosen both hexagon socket head screws, which attach the adapter brackets (1) to the legrest.
- Remove both adapter brackets.

Installing the electrically operated legrest:

- Assemble the parts in reverse order.
- Test all functions of the wheelchair.

8.23.3 Replacing the electrically operated centre-mounted legrest LNX (Modulite seat)

WARNING: Danger of crushing!

The legrest is very heavy. Danger of injury to hands and feet!

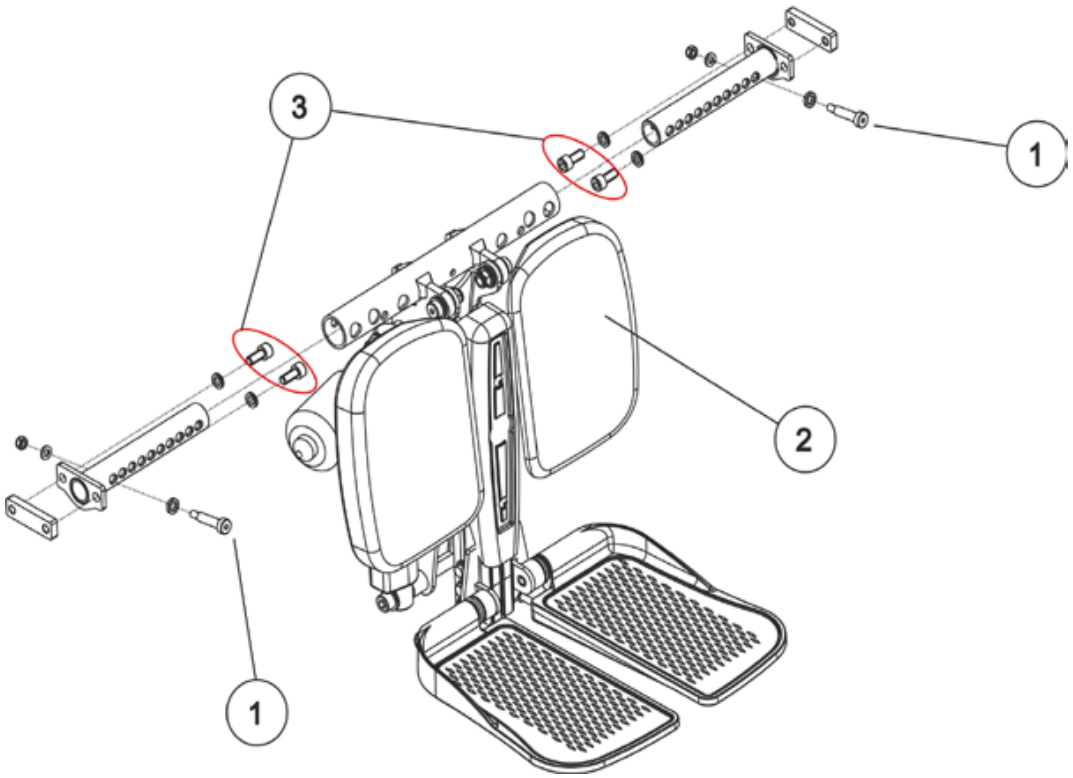
· *Pay attention to the heavy weight.*

Requirements:

- 4 mm Allen key
- 10 mm ring spanner or jaw spanner

Uninstalling the electrically operated centre-mounted legrest LNX:

- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.
- Pull the plug of the legrest actuator out of the actuator module.



- Loosen the screws (3) with a 6 mm Allen key. Pull the entire legrest (2) forwards out of the seat frame profile.
- Loosen and remove the screws (1) including the nuts and washers with a 4 mm Allen key and a 10 mm ring spanner or jaw spanner.
- Replace the legrest (2).

Installing the electrically operated centre-mounted legrest LNX:

- Assemble the parts in reverse order.
- Test all functions of the wheelchair.

8.23.4 Replacing an electric legrest actuator

WARNING: Danger of crushing!

The legrest is very heavy. Danger of injury to hands and feet!

· *Pay attention to the heavy weight.*

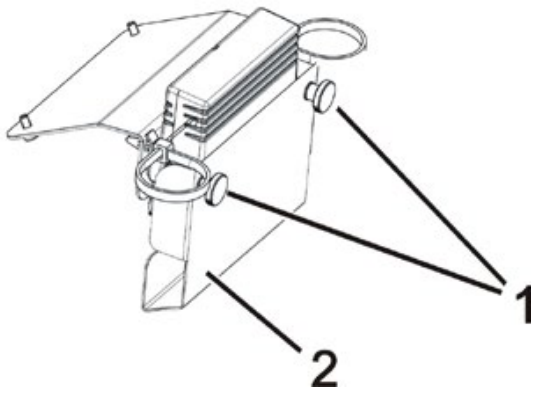
Requirements:

- 1/2" socket wrench
- 3/8" Allen key
- Side cutting pliers
- Cable ties

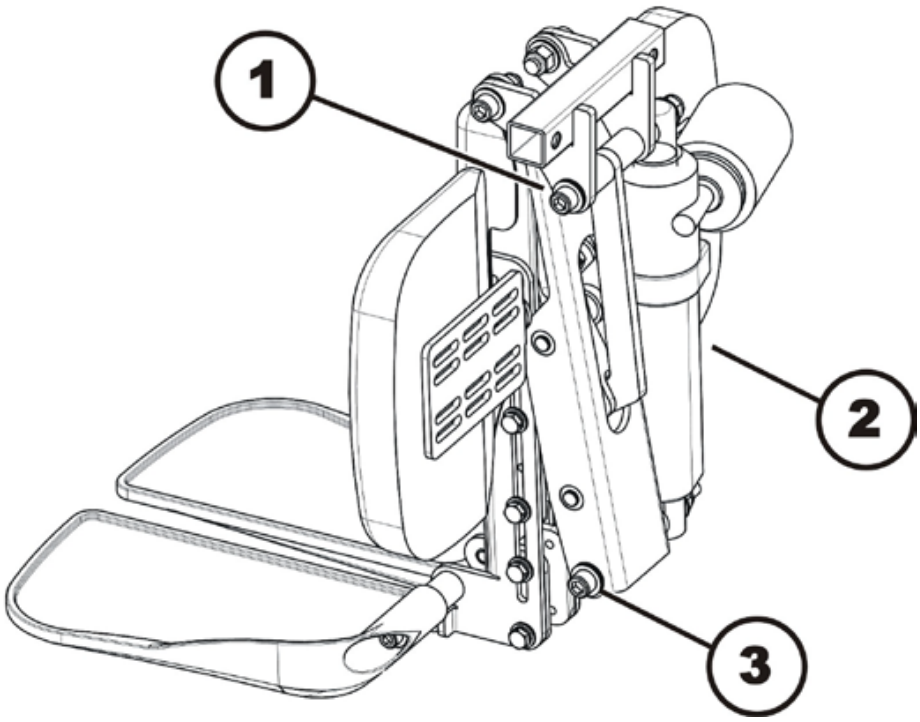
Uninstalling the electrically operated legrest:

- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.

The actuator module for the lifter and the tilt actuator are mounted to the front edge of the seat frame.



- Completely remove both knurled head screws (1) including the washers.
- Remove the cover (2).
- Pull the plug of the legrest actuator out of the actuator module.



- Use the 3/8" Allen key and a 1/2" socket wrench to loosen the screw (3).
- Use the 3/8" Allen key and a 1/2" socket wrench to loosen the screw (1).
- Remove the nuts including the washers, but leave the screw inserted in the screw hole, do not pull it completely out.
- Pull the actuator (2) toward the side off of the screws (1) and (3).
- Replace the actuator.

Installing the electrically operated legrest:

- Assemble the parts in reverse order.
- Test all functions of the wheelchair.

8.23.5 Replacing an electric legrest actuator

WARNING: Danger of crushing!

The legrest is very heavy. Danger of injury to hands and feet!

· *Pay attention to the heavy weight.*

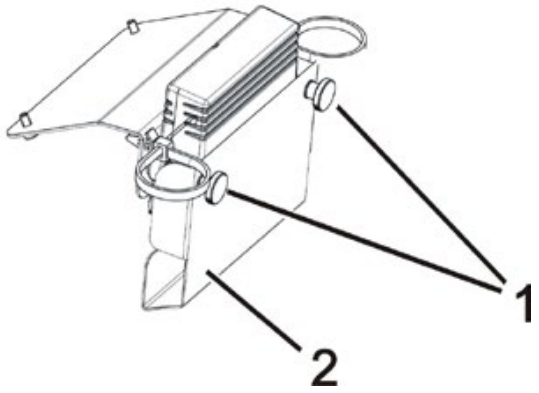
Requirements:

- 1/2" socket wrench
- 3/8" Allen key
- Side cutting pliers
- Cable ties

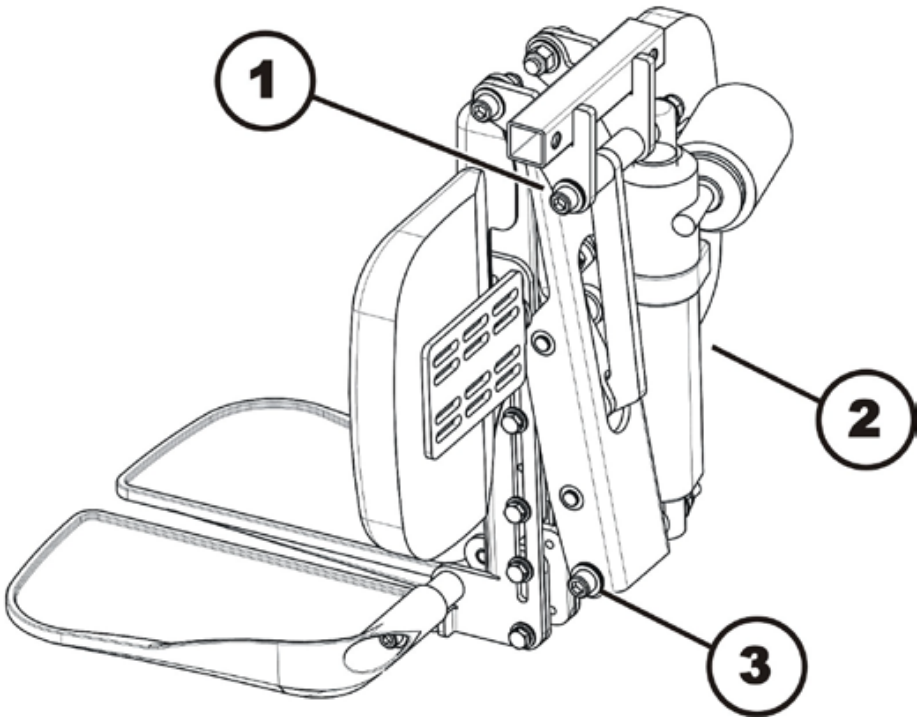
Uninstalling the electrically operated legrest:

- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.

The actuator module for the lifter and the tilt actuator are mounted to the front edge of the seat frame.



- Completely remove both knurled head screws (1) including the washers.
- Remove the cover (2).
- Pull the plug of the legrest actuator out of the actuator module.



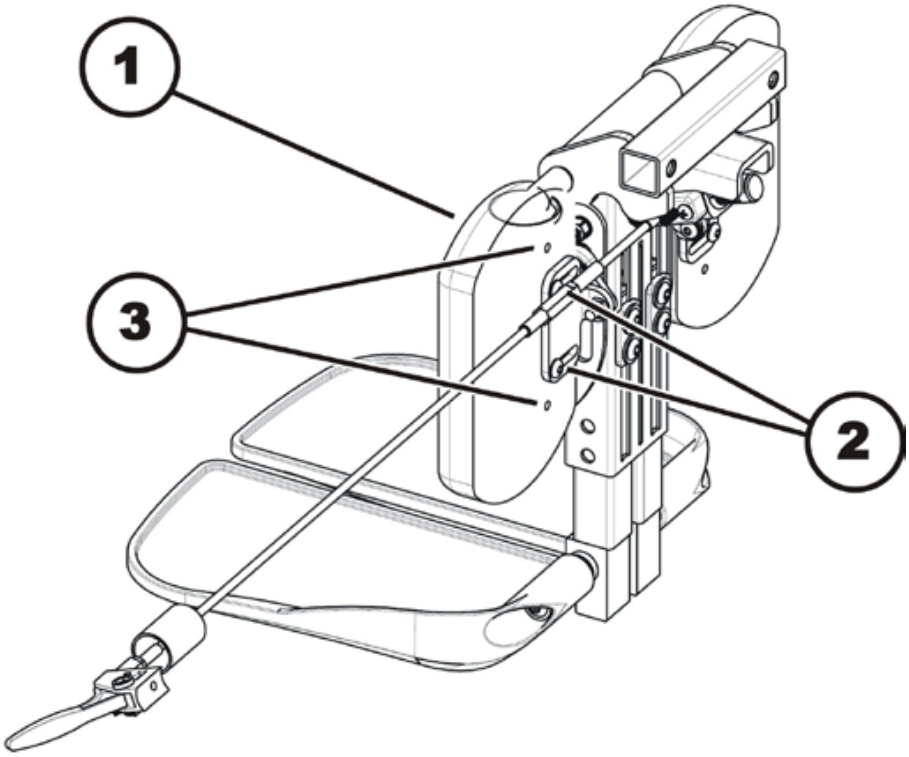
- Use the 3/8" Allen key and a 1/2" socket wrench to loosen the screw (3).
- Use the 3/8" Allen key and a 1/2" socket wrench to loosen the screw (1).
- Remove the nuts including the washers, but leave the screw inserted in the screw hole, do not pull it completely out.
- Pull the actuator (2) toward the side off of the screws (1) and (3).
- Replace the actuator.

Installing the electrically operated legrest:

- Assemble the parts in reverse order.
- Test all functions of the wheelchair.

8.23.6 Replacing the calf plate on the centre-mounted legrest (electric & manual)

Requirements:
- 1/64" Allen key



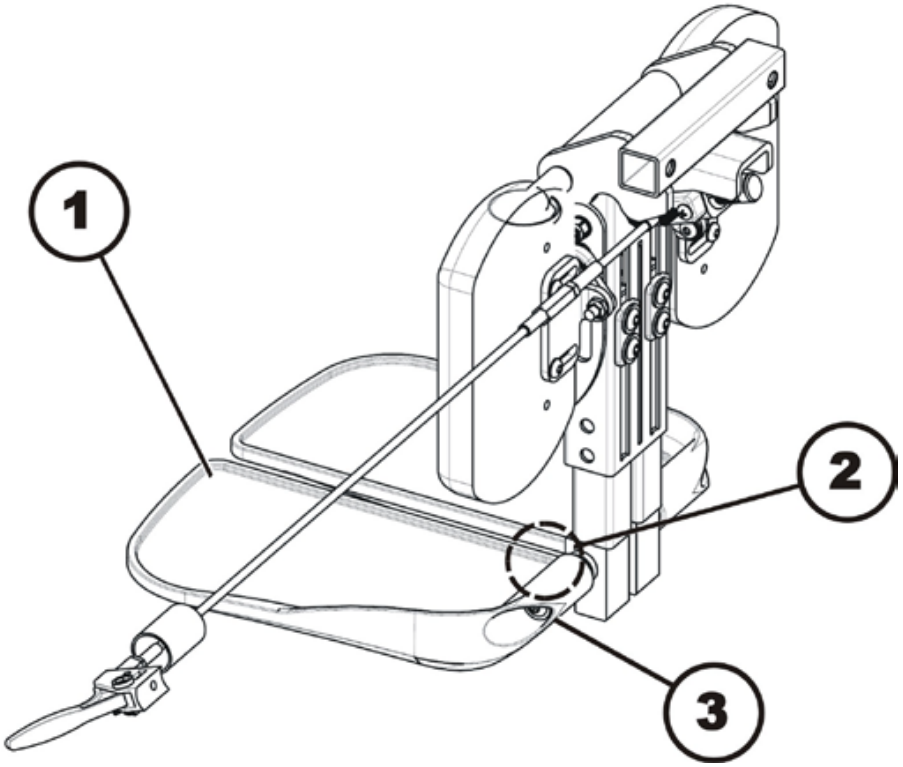
A manual legrest can be seen in the illustration. The method of fixation to the seat is almost identical with both legrests.

Uninstalling the calf plate:
- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.
- Use the 1/64" Allen key to loosen and remove both screws (2).
- Remove the calf plate (1).

Installing the calf plate:
- Assemble the parts in reverse order.
- Using the different adjustment holes (3) in the calf plate and in the calf plate brackets, the calf plates can be mounted at different heights and widths. This must be adjusted to fit the needs of the user.

8.23.7 Replacing the foot plate on the centre-mounted legrest (electric & manual)

Requirements:
- 1/64" Allen key
- 1/4" Allen key



A manual legrest can be seen in the illustration. The method of fixation to the seat is almost identical with both legrests.

Uninstalling the footplate

- If possible, raise the lifter to the highest position.
- If possible, tip the wheelchair with the tilt module as far backwards as it will go.
- Switch the electronic control system off.
- Use the 1/64" Allen key to loosen and remove both screws (3).
- Replace the foot plate (1).

Installing the footplate:

- Assemble the parts in reverse order.
- Tighten the hexagon socket head screws (3) till they are tight enough that the footplate can barely be moved.

In the area denoted by the (2) there is an adjustment screw that can only be reached when the footplate is swivelled upwards.

- Use the 1/64" Allen key to adjust the angle of the footplate to the needs of the user with this screw.

8.24 Stability lock system

8.24.1 Removing the gas cylinder

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

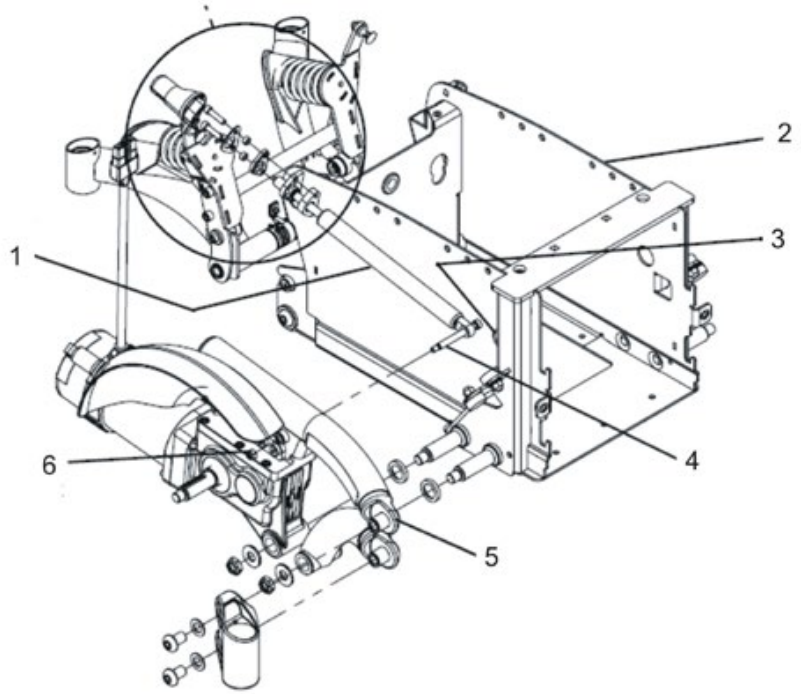
Injury hazard caused by uncontrolled movement of the mobility device!

- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

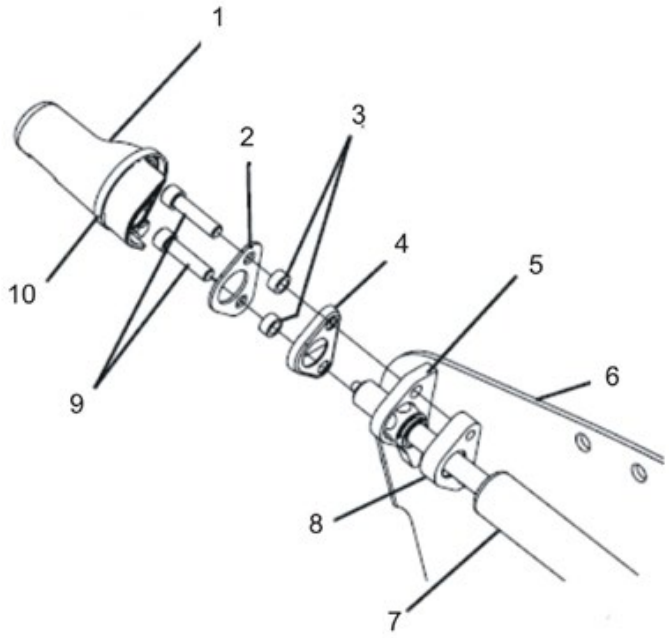
Requirements:

- 5/8“ Allen key
- 5/16“ Allen key
- Phillips screwdriver size 2
- 1/4“ socket spanner
- 5/16“ socket spanner
- torque wrench 5 - 25 Nm (or similar)
- M8 washer
- two long wooden blocks, min. 14 x 14 x 30 cm
- Loctite 242 (if the gas cylinder is repaired)

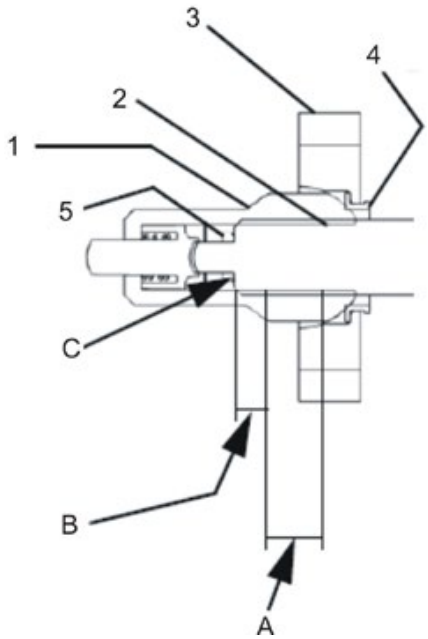
- Lift the wheelchair up on one side and place a 14 cm high wooden block under the battery case so that the wheels are off the ground and can rotate freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Remove both the stability lock system protective caps.
  The protective caps on the stability lock system will either be held using a screw or a cable tie depending on the wheelchair's date of manufacture.
- Remove the batteries as described in chapters 8.5.1 and 8.5.2/8.5.3.
- Remove the drive wheel as described in chapter 8.10.1.



- Rotate the top walking beam (5) so that you can reach the screw (4) on the gas cylinder through the drillhole (3) in the battery case.
- Remove the nut (6) with a 1/4" socket spanner. Use a 5/16" Allen key to counter the bolt while doing so.
- Push the bolt (4) towards the battery case so that the gas cylinder (1) is separated from the walking beam.
- Push the gas cylinder against the battery case.
- Raise the rear axle so that the gas cylinder is activated and then retract the cylinder.
- Push the gas cylinder to the rear and pull it off the battery case.



- Undo the two Allen screws (9) with a 1/4" Allen key.
- Remove the bolts together with the washers (3) and the plates (2) and (4).
- Remove the gas cylinder from the mounting (5).



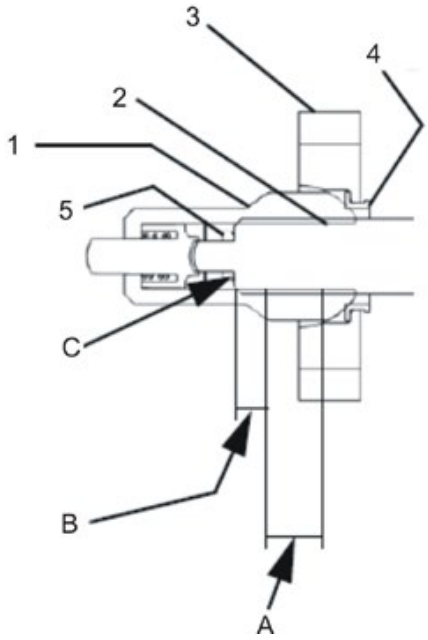
- Remove the guide bush (1) if you wish to replace it or the gas cylinder itself.
- Remove the guide bush fixing (3) and/or the clamping support (4).

8.24.2 Repairing the gas cylinder

When a gas cylinder has been removed, it can be completely replaced or to have a range of maintenance work carried out on it as described in the following sub-chapters.

1. Replacing the guide block fixing (3) and/or the clamping support (4). See chapter 8.24.2.1.
2. Replacing the guide bush (1). See chapter 8.24.2.2.
3. Replacing the gas cylinder. See chapter 8.24.2.3.

All the sub-chapters relate to the following graphic:



8.24.2.1 Replacing the guide block fixing or clamping support

Removing:

- Remove the guide bush (1) from the gas cylinder piston (2).
- Remove the guide block fixing (3) from the gas cylinder piston.
- Remove the clamping support (4) from the gas cylinder piston.

Refitting:

- Refit the replaced clamping support and guide block fixing in reverse order.
- Apply a little Loctite 242 to the end of the gas cylinder piston in the area marked (A) on the graphic. It is imperative that you do NOT apply Loctite to the locations marked (B) and (C)!
- Push the ball joint onto the gas cylinder until the end of the gas cylinder piston touches the release head (5).

8.24.2.2 Replacing the guide bush

Removing:

- Remove the guide bush (1) from the gas cylinder piston (2).

Refitting:

- Apply a little Loctite 242 to the end of the gas cylinder piston in the area marked (A) on the graphic. It is imperative that you do NOT apply Loctite to the locations marked (B) and (C)!
- Push the new guide bush onto the gas cylinder piston until the end of the gas cylinder piston touches the release head (5).

8.24.2.3 Replacing the gas cylinder

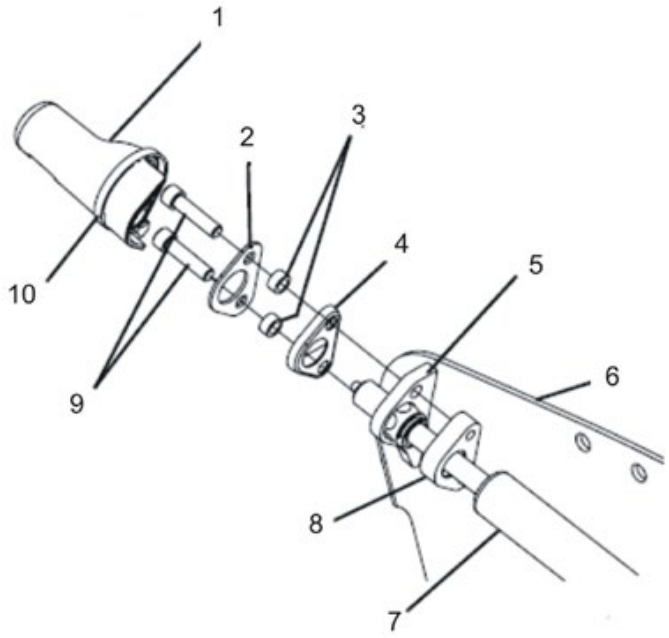
Removing:

- Remove the guide bush (1) from the gas cylinder piston (2).
- Remove the guide block fixing (3) from the gas cylinder piston.
- Remove the clamping support (4) from the gas cylinder piston.

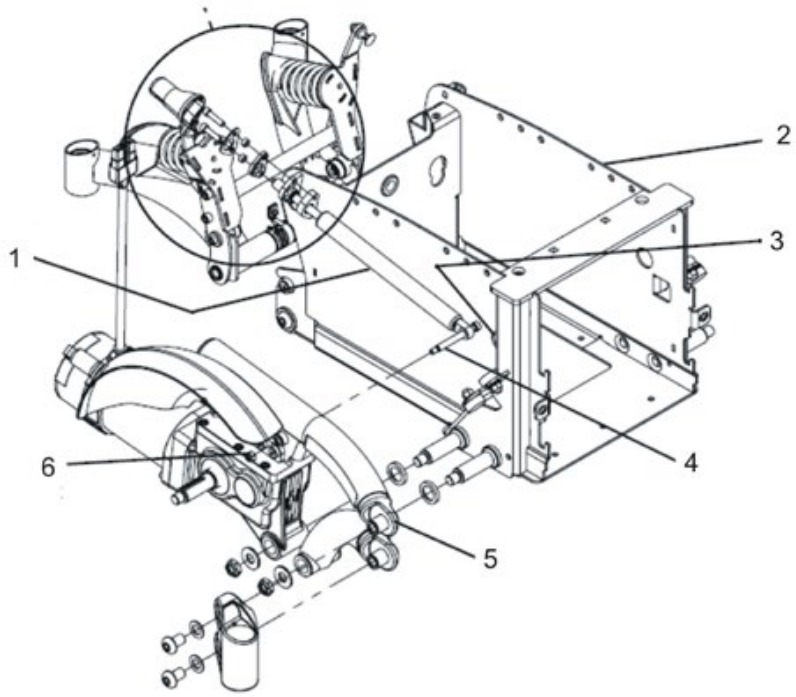
Refitting:

- Refit the clamping support and guide block fixing to the new gas cylinder piston in reverse order.
- Apply a little Loctite 242 to the end of the gas cylinder piston in the area marked (A) on the graphic. It is imperative that you do NOT apply Loctite to the locations marked (B) and (C)!
- Push the guide bush onto the gas cylinder piston until the end of the gas cylinder piston touches the release head (5).

8.24.3 Refitting the gas cylinder



- Move the gas cylinder guide bush into the battery case holder (5).
- Hold the gas cylinder in position and lift the rear axle so that the gas cylinder ball joint is pressed.



- Push the gas cylinder (1) from the front towards the rear into the holder until the bottom end is just in front of the hole (3) in the battery case (2) and you can insert the screw (4).
- Rotate the top walking beam (5) so that you can insert the screw (4) through the drillhole (3) on the gas cylinder into the gas cylinder and walking beam.
- Push the bolt (4) through. Fix the bolt with a 5/16" Allen key.
- Fit the nut (6) with a 1/4" socket spanner onto the bolt and tighten the nut to 8.5 Nm.
- Fit both the stability lock system protective caps.
- Fit the drive wheel as described in chapter 8.10.1.
- Replace the batteries in their correct location as described in chapters 8.5.2/8.5.3 and 8.5.1.
- Remove the wooden block from under the wheelchair.

8.24.4 Replacing the setting screw

WARNING: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

Injury hazard caused by uncontrolled movement of the mobility device!

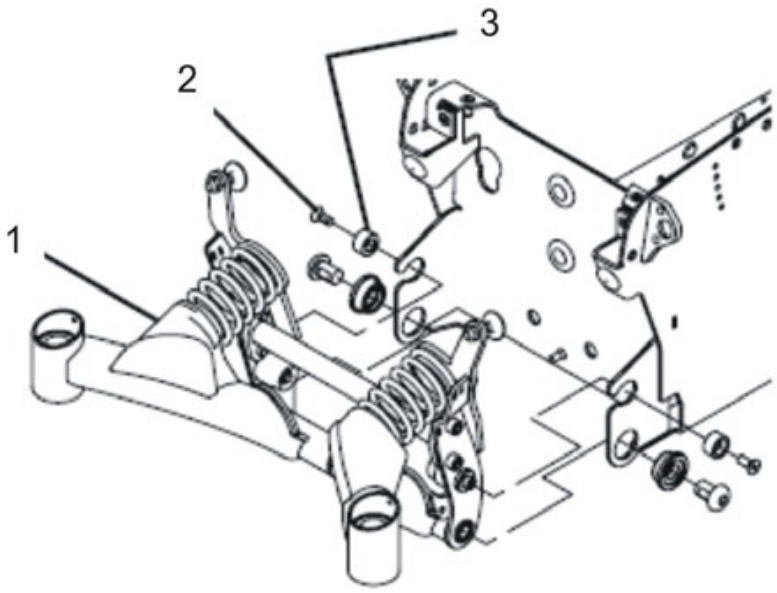
- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Before raising the vehicle, secure the wheels by blocking them with wedges.*

Requirements:

- 1/4“ socket spanner
- two long wooden blocks, min. 14 x 14 x 30 cm
- M8 washer

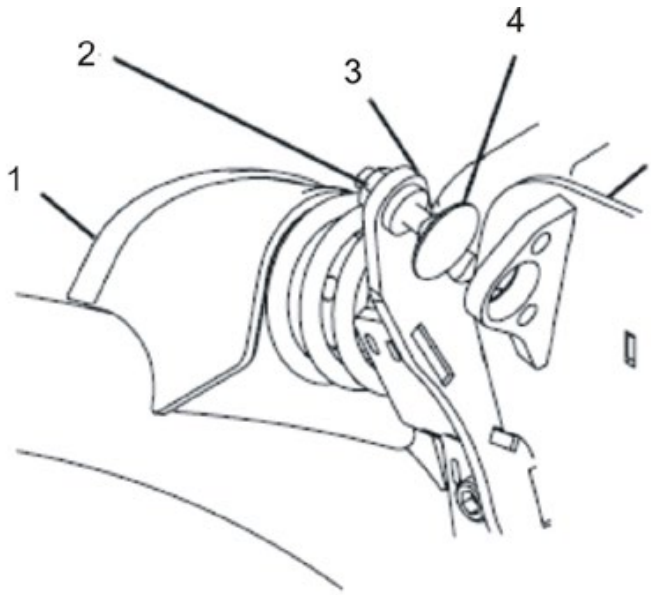
Note

Invacare® recommends always replacing both setting screws simultaneously in order to ensure that the wheelchair works perfectly.



Removing the setting screw:

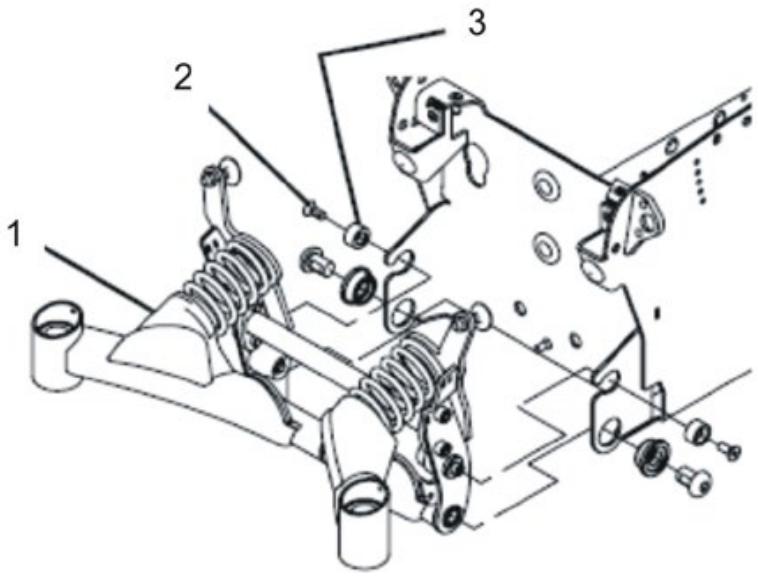
- Lift the wheelchair up on one side and place a 14 cm high wooden block under the battery case so that the wheels are off the ground and can rotate freely. Use proper lifting techniques.
- Repeat the same procedure on the other side of the wheelchair.
- Remove both the stability lock system protective caps.
  The protective caps on the stability lock system will either be held using a screw or a cable tie depending on the wheelchair's date of manufacture.
- Undo the two bolts (2) with a 1/4" socket spanner, and remove the bolts together with the nylon washers (3).



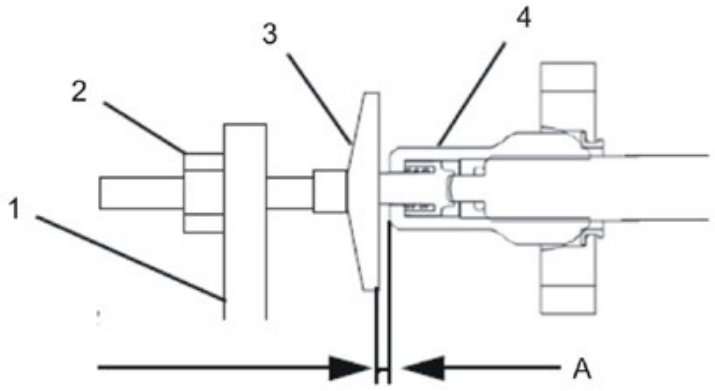
- Undo and remove the lock nut (2), the setting screw (4) with a 1/4" socket spanner.
- Rotate the setting screw (4) towards the battery case until it can be removed from its holder (3).

Refitting the setting screw:

- Screw the new setting screw (4) into the holder (3).



- Screw the two bolts (2) together with their nylon washers (3) in again.
- Tighten the bolts using a 1/4" socket spanner.
- Remove the wooden block from under the wheelchair so that all wheels and castors are in contact with the floor.

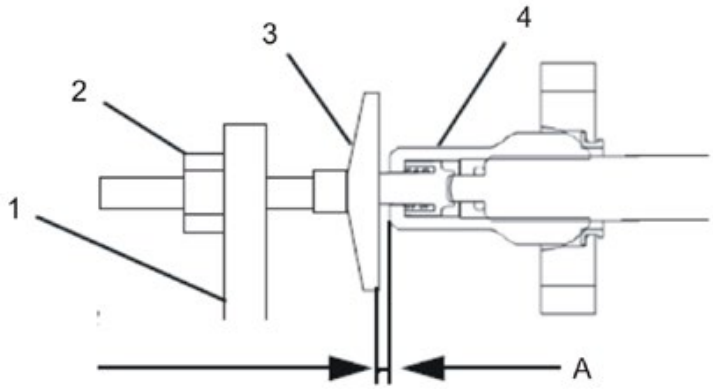


Note
For the following operation, use an M8 washer as a thickness gauge.

- Rotate the setting screw (3) until it has a space of 1.5 mm (A) between it and the gas cylinder (4).
- Fit the lock nut (2) and tighten it using a 1/4" socket spanner.
- Refit the two protective caps again.

8.24.5 Adjusting the setting screw

Requirements:
- 1/4“ socket spanner
- M8 washer



- Remove both the stability lock system protective caps.
  The protective caps on the stability lock system will either be held using a screw or a cable tie depending on the wheelchair's date of manufacture.
- Ensure that the wheelchair is contacting the floor with all its wheels and castors.
- Loosen and remove the two locknuts (2) with a 1/4" socket spanner.

Note
For the following operation, use an M8 washer as a thickness gauge.

- Rotate the setting screw (3) until it has a space of 1.5 mm (A) between it and the gas cylinder (4).
  Tip: use an M8 washer as a thickness gauge.
- Fit the lock nut (2) and tighten it using a 1/4" socket spanner.
- Refit the two protective caps again.

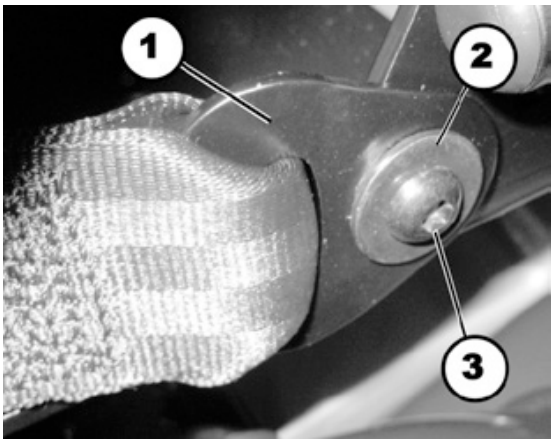
9 Installing accessories

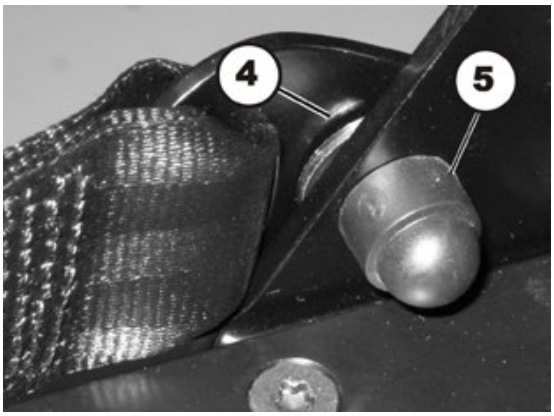
9.1 Replacing the safety belt

Requirements:
- open-ended spanner, 13 mm
- 5 mm Allen key

Note
A nut is fixed between the two washers (2) and (4) as a spacer so that the belt mounting can rotate freely.

- Remove the plastic cap (5).
- Loosen the bolt (3) and the associated nut (in the figure this is covered by the plastic cap) with a 5 mm Allen key and a 13 mm socket spanner.
- Remove the nut.
- Remove the bolt including safety belt and flat washers (2) and (4).
- Remove the flat washers (4).
- Replace the safety belt (1).
- Refit the parts in the reverse order.

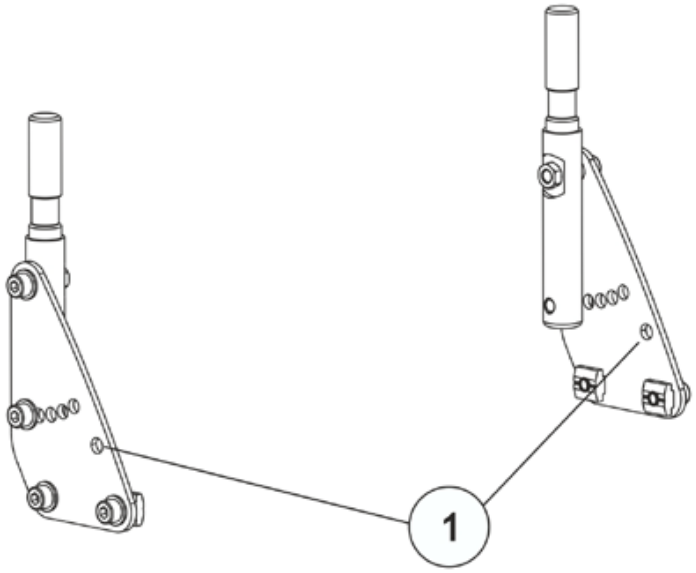




9.2 Replacing seat belts (Modulite seat)

9.2.1 Installation on the backrest mounting bracket (simple backrest)

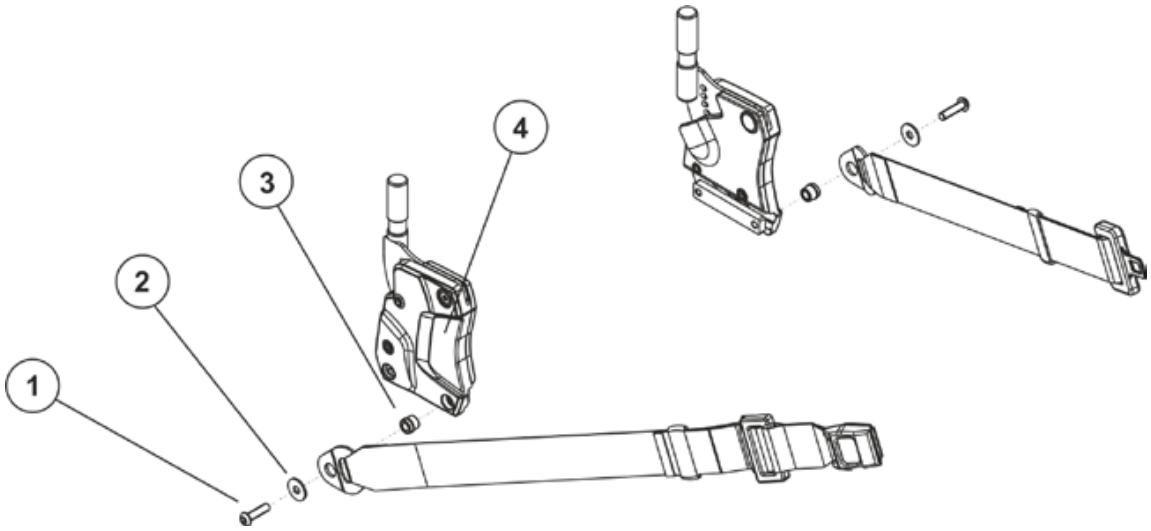
Requirements:
- Socket spanner,13 mm
- 5 mm Allen key



- The seat belts are attached via the drill hole (1) at the top right.
- The installation of seat belts is described in chapter 9.1.

9.2.2 Installation on the backrest mounting bracket (adjustable seat)

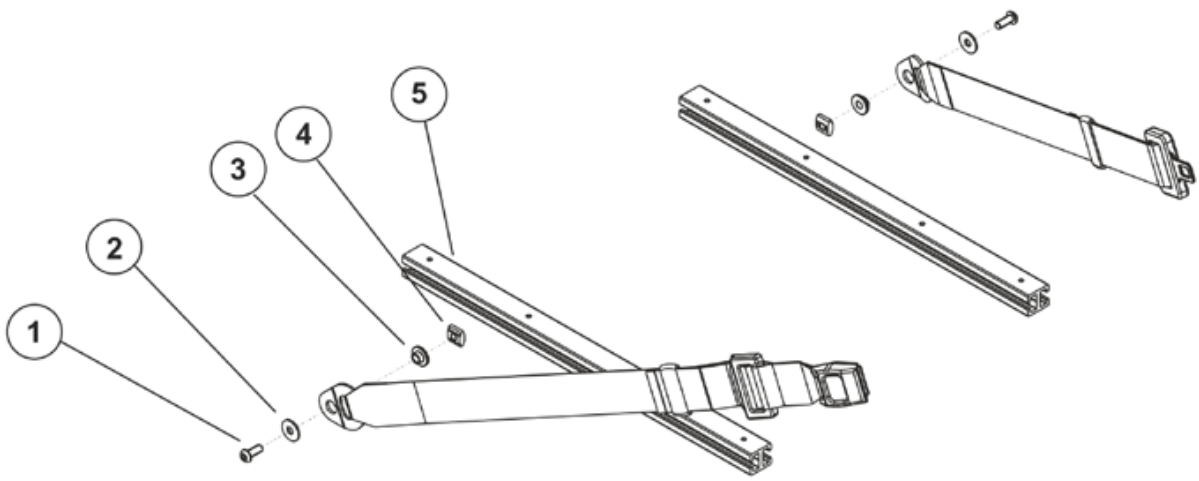
Requirements:
- 5 mm Allen key



- Loosen the screw (1) with a 5 mm Allen key.
- Remove the screw (1), the corresponding washer (2) and the seat belt and belt winder (3) from the backrest mounting bracket (4).
- Replace the safety belt.
- Refit the parts in the reverse order.

9.2.3 Installation on the seat frame profile (adjustable seat)

Requirements:
- 5 mm Allen key



- Loosen the screw (1) with a 5 mm Allen key.
- Remove the screw (1), the washer (2), the seat belt, the sliding bushing (3) and the sliding block (4) from the seat frame profile (5).
- Replace the safety belt.
- Refit the parts in the reverse order.

9.3 DAHL docking station (TDX SP2 / TDX SP2^{NB})

CAUTION: Danger of crushing!

The mobility device is very heavy. Injury hazard to hands and feet!

- *Use proper lifting techniques.*

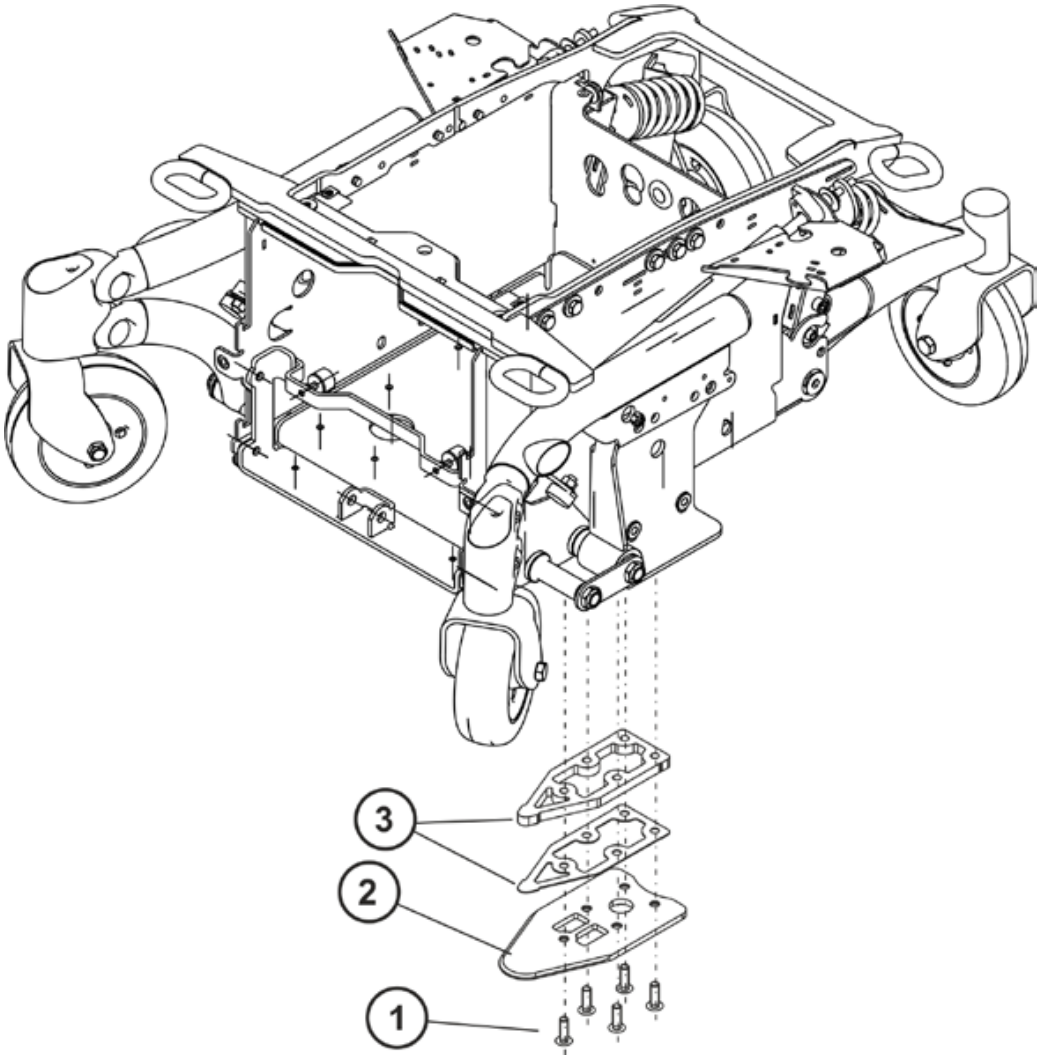
Injury hazard caused by uncontrolled movement of the mobility device!

- *Switch the power supply off (ON/OFF key).*
- *Engage the drive.*
- *Position the mobility device on it's side and secure the position so it does not turn over.*

Requirements:

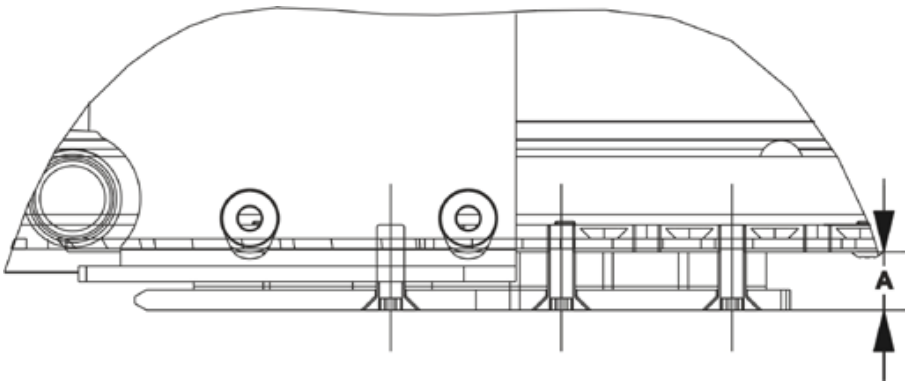
- 6 mm Allen key
- high-strength screw blocker system, e.g. Loctite 270

Refitting the DAHL docking station:



Note
Depending on the vehicle, several spacers (3) may be required in addition to the safety plate (2). Please refer to the documentation provided by DAHL (see also www.dahlengineering.dk) for information on whether and how many spacers are required.

Note
The countersunk screw (1) material quality must be at least 8.8.
If spacers have been fitted, the screws length should be completed as follows:
A = thickness of safety plate and spacers



A = +7 mm Screw length

Note
When installing the plates, pay attention to the right screw length (A +7 mm).
Longer screws can damage the batteries. .

- Remove the legrests
- Jack up the wheelchair using several wooden blocks. Use proper lifting techniques.
- Calculate the required screw length in accordance with the above formula.
- Select five M8 Allen key countersunk screws in accordance with DIN 7991 (material quality at least 8.8) to suit the calculated length.
- Fit the spacers (3) and the safety plate (2) over the drillholes.
- Fit the Allen screws (1) with a high-strength screw blocker system such as Loctite 270.
- Fit the remaining parts in the reverse order.
- To conclude, check all fittings for secure connection.

Dismatling the DAHL docking station:

- Dismantle the remaining parts in the reverse order.

9.4 Further accessories

Note
The installation instructions for additional accessories are available at your Invacare® specialist supplier or directly from Invacare®.

10 Adjusting the seating position

In order to adapt the mobility device optimally to the requirements of the user, we recommend that you ask your authorised Invacare® the dealer toadjust the seat depth individually.

Adapting the seat to the user's seating position depends on which seat has been fitted, and should be carried out in the following sequence.

1. Adjusting the lower leg length and seat depth, see chapter 10.1.
2. Adjusting the center of gravity of the seat frame, see chapter 10.2.
3. Checking that the swivel castors can move freely.
4. Repetition of steps 2 to 3, if necessary.

WARNING!

Danger of injury hazard after tilting of mobility caused by blocked steering wheels.

- *Always check the seat depth settings for both forward and reverse movement.Make sure that steering wheels can rotate freely and have not contact to any fixed mobility device component.*

CAUTION!

Any changes to the drive program can affect the driving characteristics and the tipping stability of the vehicle!

- *Changes to the drive program may only be carried out by trained Invacare® specialist dealers!*
- *Invacare® supplies all wheelchairs with a standard drive program ex-works. Invacare® can only give a warranty for safe vehicle driving behaviour - especially tipping stability - for this standard drive program!*

WARNING: Danger of crushing!

The seat is very heavy. Danger of injury to hands and feet.

- *Pay attention to the hand and feet*
- *Use proper lifting techniques*

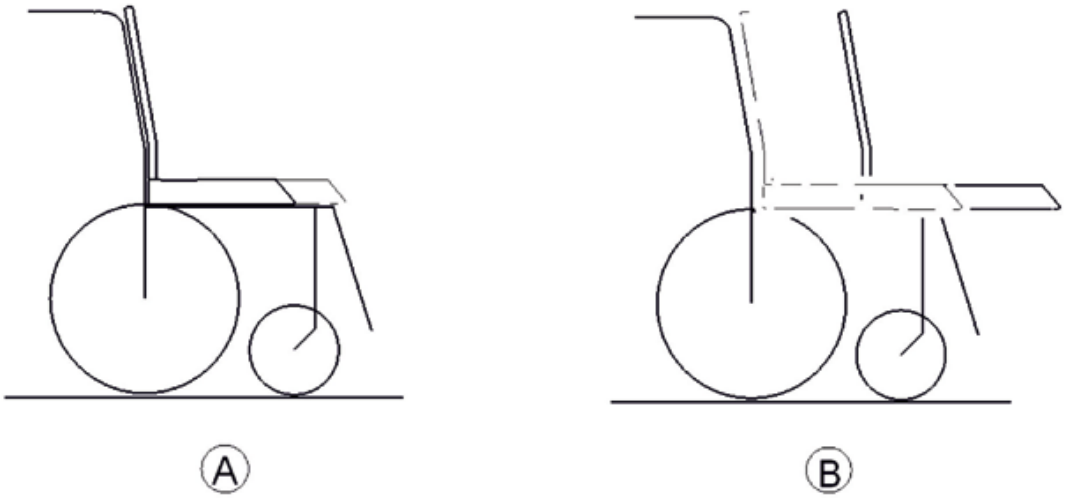
10.1 Adjusting the lower leg length and seat depth

10.1.1 Adjusting the lower leg length

Invacare® offers a range of legrests which can be adjusted individually.

See operation manual.

10.1.2 Adjusting the seat depth



A: Seat depth

B: Center of gravity of the seat/ seat position

Standard seat
The Seat depth is adjusted by moving the seat back.

Modulite seat
The seat depth is adjusted by shifting the position of the backrest.

See User Manual.

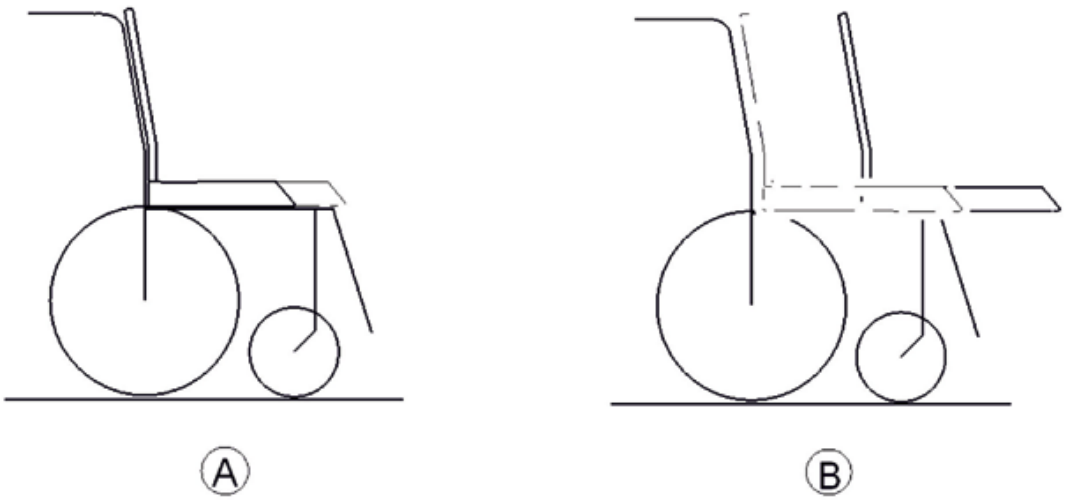
10.2 Adjusting the center of gravity of the seat

The center of gravity of the seat can be adjusted by mounting the seat frame farther towards the front or the rear on the seat.

CAUTION!

The seating system of the electric wheelchair is delivered ex works with an optimally adjusted center of gravity. Any change in this adjustment setting can negatively influence the stability of the electric wheelchair.

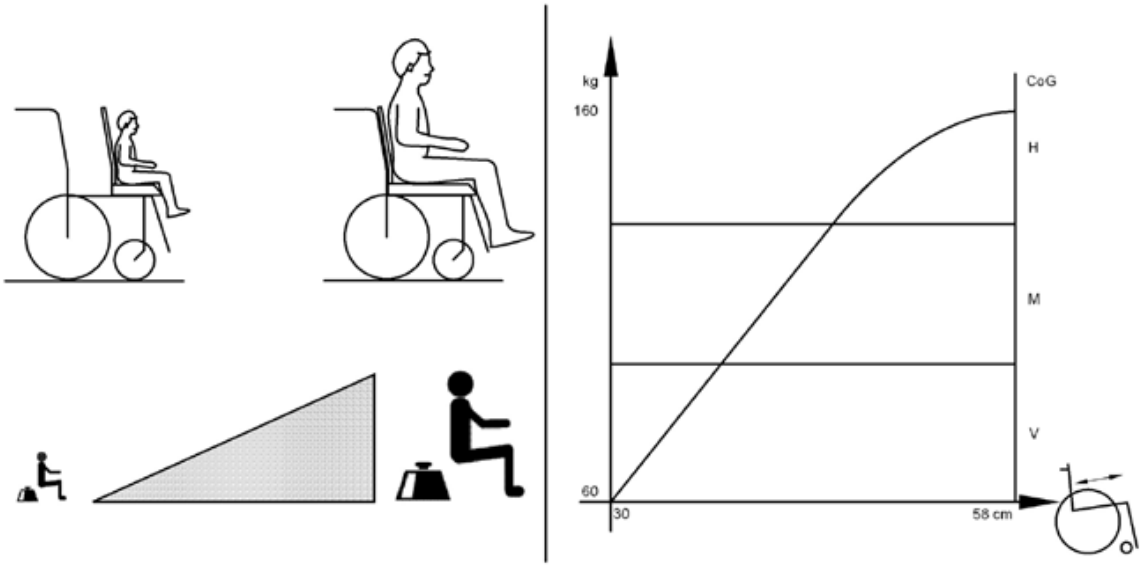
- *You must perform an individual risk analysis every time you change the center of gravity of the seating position, in order to ensure the safety and stability of the electric wheelchair.*



A: Seat depth

B: Center of gravity of the seat/ seat position

Note
The user weight and seat depth have strong influences on the choice of the Center of gravity of the seat. If the user is heavy and the seat depth is greater, the focus should be the farther back.



For best possible driving characteristics of rear-wheel drive wheelchairs, the weight to be distributed: 30 – 40 % front and 60 - 70 % rear.

WARNING!

Danger of damage due to collisions of the legrests with other parts of the wheelchair!

- *Set the legrests to the smallest angle before adjusting the seat center of gravity.*
- *Pay attention with adjusting the seat center of gravity that the legrests do not touch any other parts of the wheelchair. This ensures that the legrests can not collide with other parts of the wheelchair.*

10.2.1 Standard seat

Depending on the seat that is installed, you can attach the seat at different points on the seat frame and thus set the seat depth.

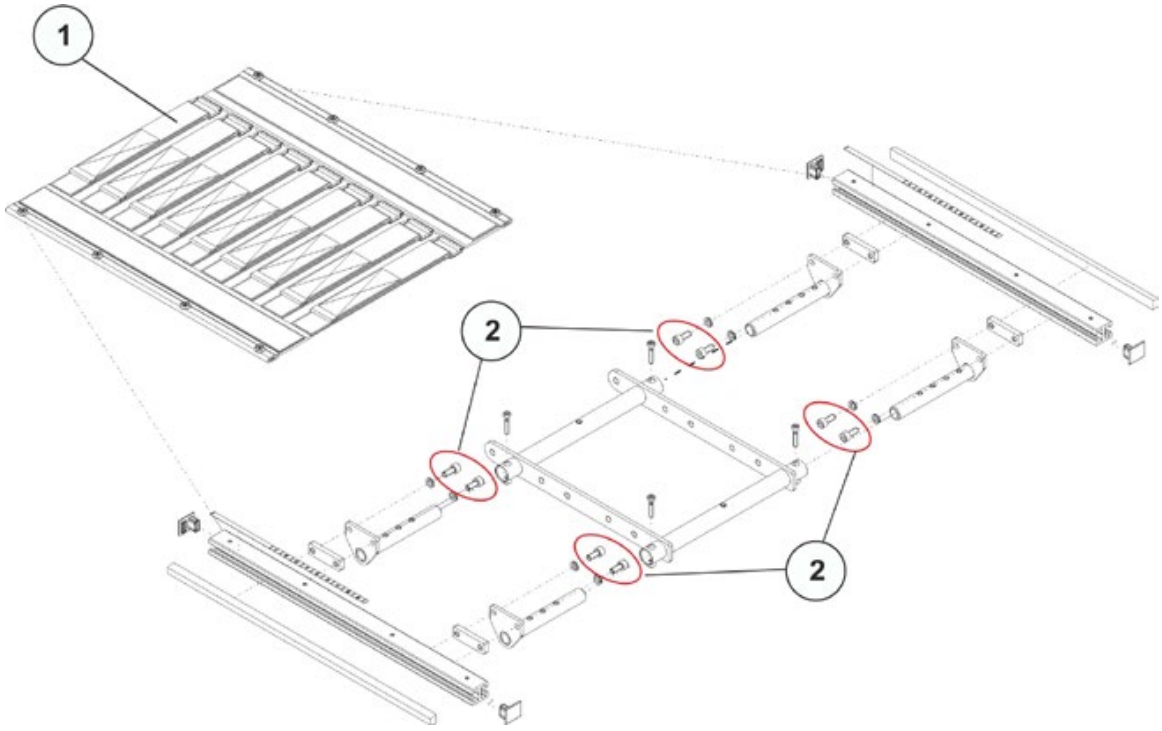
10.2.2 Modulite seat

The Modulite seat is available in two versions:

- Adjustable seats (plate and strap):
  Adjustment of the center of gravity via the lateral profiles, as described in chapter 10.2.2.1.
- Simple seat:
  Adjustment of the center of gravity via the oblong holes of the seat adaptor.
  TDX SP / TDX SP^{NB} - chapter 10.2.2.2
  TDX SP2 / TDX SP2^{NB} - chapter 10.2.2.3

10.2.2.1 Adjustable seats

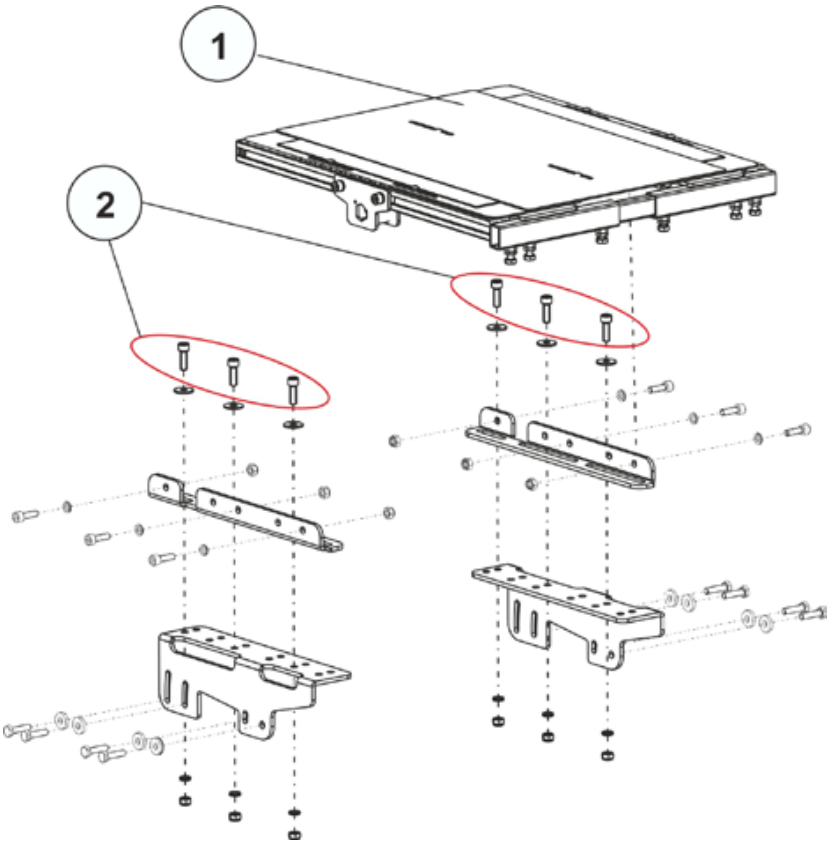
Requirements:
- 6 mm Allen key



- Remove the seat plate or sling seat (1), see chapter 8.22.1.
- Loosen the socket head screws (2) in the front and rear, left and right – DO NOT remove.
- Shift the position of the seat.
- Re-tighten the screws.
- Install the seat plate or the sling seat again.

10.2.2.2 Simple seat (TDX SP / TDX SP^{NB})

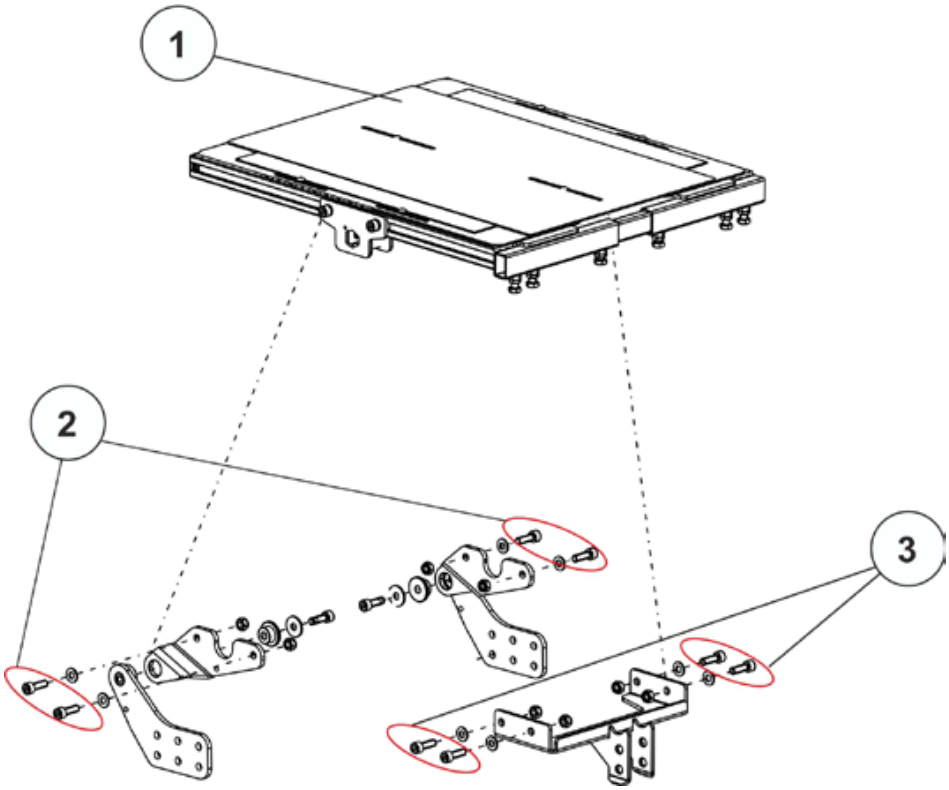
Requirements:
- 6 mm Allen key



- Remove the seat plate (1) or the sling seat, see chapter 8.22.1.
- Loosen the socket head screws (2) in the front and rear, left and right – DO NOT remove.
- Shift the position of the seat frame.
- Re-tighten the screws.
- Install the seat plate again.

10.2.2.3 Simple seat (TDX SP2/ TDX SP2^{NB})

Requirements:
- 6 mm Allen key



- Remove the seat plate (1) or the sling seat, see chapter 8.22.1.
- Loosen the socket head screws (2) and (3) in the front and rear, left and right – DO NOT remove.
- Shift the position of the seat frame.
- Re-tighten the screws.
- Install the seat plate again.